FOUNDRY TRADE JOURNAL

Established 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

Vol. 84 Thursday, May 13, 1948 No. 1654

49, Wellington Street, London, W.C.2

'Grams: "Zacatecas, Rand, London"

'Phone: Temple Bar 3951 (Private Branch Exchange)

PUBLISHED WEEKLY: 21s. per annum (Home and Overseas)

"Cramming" and Culture

It is the modern habit to break down jobs into their simplest operations in order to manufacture cheaply. Apparently the Joint Committee on Metallurgical Education* must have had this uppermost in their minds when they decided to report on University entrance examinations. There is a laudable desire that the metallurgical profession should be embellished with a degree of culture of a standard not invariably reached to-day. They hope to achieve much by reorganising the work of the 16 to 18 years old so as to replace specialisation—or should it be "cramming"—by studies of a more cultural character. With this we are enthusiastically in agreement, but why does the Committee imagine that these two years are the critical period? We believe that the inculcation of culture starts at the age of three and continues until maturity. Moreover, we would give equal importance to the activities of the student at the University.

Some undergraduates—probably far too many—only study the subjects in which they will be examined, this procedure being mainly based on the assumption that a degree is the passport to a good livelihood. Others acquire much culture by continuous social contact with men reading law, medicine, or the various branches of arts and divinity. The former will probably head the examination lists, whilst the latter will later assume leadership in the professions of their choice. Culture, as such, is not the only major object to be sought. There is, and it is well expressed in the Report, the need for the graduate to be able to express himself in plain readable English. A country medical doctor recently showed us a selection of applications for a position as *locum tenens*, and, to our amazement, very few of them were better composed than those emanating from workmen applying for a position as charge-hand.

This also applies to some graduates in metallurgy. We cannot help but feel that such people have not learnt the elementary lesson that by following a trade, or successfully reading for a profession, all they have done is to acquire the right to apply for positions in fields limited to those so qualified. Once they are established in their professions, they will find that the percentage of their thought output of a purely professional character will be something less than 1 per cent. The other ninety-nine will result from experiences not acquired in class. An early appreciation of this important factor is a solid foundation upon which to build future success. The Committee, upon which the Iron and Steel Institute, the Institution of Mining and Metallurgy, the Institute of British Foundrymen, the Institute of Metals, and the Institution of Metallurgists are represented, has done well to underline the necessity of a broader basis for the examination of University entrants, and it would be well occupied if it made recommendations as to the sort of life a student should lead during his studies. We personally would suggest that the long vacation be spent abroad—and not necessarily in a metallurgical works. Culture, not agriculture as was at one time the case, is, or should be, the call to the student during the long summer vacation.

*Recommendation on Qualifications for Entrance to University Schools of Metallurgy. Published by the Joint Committee on Metallurgical Education, 4, Grosvenor Gardens, London, S.W.1.

Contents

"Cramming" and Culture, 455.—New Institute Session Inaugurated, 456.—Conditions of Employment, 456.—Dry-Sand Patterns, 457.—Notes from the Branches—Wales and Monmouth, 461.—House Organs, 462.—Book Review, 462.—New Catalogues, 462.—Nodular Cast Iron, 463.—Correspondence, 463.—New Foundry at Bangor, 464.—The Aluminium Development Association, 464.—The Constant-charge System of Cupola Operation, 465.—Embellishing the Canteens, 468.—Institute Elects New Members, 469.—Notes on the Practice at Argus Foundry, 471.—Publication Received, 473.—Cold-cathode Lamps in a Foundry, 473.—Company news, 474.—Dr. Van der Bijl's Report Not to be Published, 475.—Director of Defence Research, 475.—Personal, 476.—News in Brief, 478.—Raw Material Markets, 480.—Cammell Laird's Capital, 480.—No Decision Yet on Re-opening of Metal Exchange, 480.

New Institute Section Inaugurated

At the conclusion of the Annual Meeting, held in Cardiff, of the Wales and Monmouth Branch of the Institute of British Foundrymen, over which Mr. W. H. Thomas presided, a new section to serve West Wales was officially inaugurated. The new section is designed to interest Swansea and Llanelly foundrymen. The inaugural address was given by Mr. V. C. Faulkner, editor of the FOUNDRY TRADE JOURNAL, and President of the International Committee of Foundry Technical Associations. Mr. Faulkner took for his theme the strength of the Institute is in its Branches and Sections, and so too is its weakness. Drawing on his experiences as a branch secretary, and a national president, he sought to show how by care in the choice of officers, by dignified, enlightened publicity and by the use of modern visual educational methods, a sure foundation could be laid. From the resulting edifice, the Institute could in its turn be certain of a supply of men of character and experience to guide its affairs in the future. It was by no mere chance, but by foresight, that the Institute had the benefit of the outstanding services of Mr. Edward Williams, Mr. J. J. McCleland, Mr. Richardson, Mr. Wall and many others.

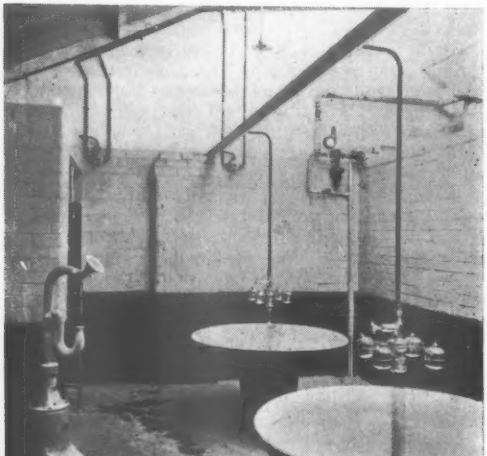
Mr. Faulkner was deputising for Mr. T. Makemson, M.B.E., the secretary, who, as everybody was distressed to learn, was unable to attend through illness.

Before inaugurating the new section, Mr. Faulkner presented prizes to the winners of a short-paper competition. The successful recipients were Mr. C. Badcock, Mr. J. Greatrex, and Mr. W. H. Robotham, all of whom were on the staff of Brown Lenox, of Pontypridd.

An account of the Annual Meeting will be printed shortly.

Conditions of Employment

Higgs Motors, Limited, of Witton, Birmingham 8, have just issued a new edition of their "Conditions of Employment." A copy is given to every person joining the staff of the company. It takes 11 out of the 16 pages to detail all these conditions, and whilst discipline is insisted upon, there are listed the many attractions to be associated with employment in large works. The growth of the organisation has been stressed and with it is the obvious implication of individual progress—a factor sometimes forgotten.



MODERN FOUNDRY AMENITIES PROVIDED BY MANLOVE, ALLIOTT & COMPANY, LIMITED. ABOVE, WASH BASINS AND HOT-AIR DRIER; RIGHT, CHANGING ROOM.

Dry - Sand Patterns*

Alternative Methods for Making Patterns for Non-repetition Jobs

By James Timbrell, Senior

Introduction

The use of sand, or loam, to form part or the whole of a pattern is probably as old as the industry. Skeleton wood-framed patterns for large heavy castings, and for designs of a special nature, for use once or twice, is ordinary practice in many foundries. The open spaces in between the skeleton framing is usually filled in with stiff loam and left to dry out. Generally, the important pieces are made of wood, to ensure a dimensional and machining accuracy; the actual metal sections, as made by the sand pattern and mould, allow a good latitude, and normally a bit added to, or subtracted from, specificational thicknesses is tolerated, because the sand-pattern outlines, obviously, cannot be controlled to the same accuracy as those of a whole wood pattern. Fig. 1, at (A), shows a simple form of wood pattern, with open spaces and some parts rammed up with sand as described.

Application of Sand Patterns

Any method of patternmaking which will save actual patternmaking time and costs, and also be good enough to produce reasonably accurate sound castings for small-order requirements, has much to recommend it. Difficulties and delay in obtaining patterns and the understandably high charges, generally, are very pertinent to the small jobbing founder who buys pattersn from the independent patternmaker, few of whom are in a position to accept the casual small needs of a jobber for an urgent small order. This may be a pattern just good enough to make, say, one or half dozen off. Quite often a broken casting can be used as the pattern, with a few strips of wood added for machining allowances, and perhaps a boss or two stuck into place, with a framed corebox and strickle to complete the job. It is not unusual for a small jobbing foundry to have no line of manufacture of its own, and by reason of the casual nature of its requirements it cannot expect first consideration over the regular-demand customer. In the large engineering concerns which have their own pattern shop these difficulties are not so pronounced.

The purpose of this Paper, which is called Dry-sand Patterns, is to show a method which will in several ways ease some of the problems in patternmaking for the smaller jobbing foundries. It may also be considered useful to the larger pattern shops, where every inch of timber is of value and the circumstances and design are suitable for the use of method described.

It cannot be overemphasised that the system set out has many limitations. It is not offered or recommended for castings which are required to be to close specifications and limits of machining allowances, nor can it be used for patterns which are to be used for repetition orders. However ordinary the design, size limits also have to be considered, because a solid dry-sand pattern is considerably heavier than wood, although, in a bulky design, some weight can be taken out by a little planning in the early stages. The method has been found useful in many ways, it has saved many hundreds of pounds in patternmaking costs and reduced delay to almost zero, it has, so to speak, same-day delivery. Where the design is simple and close limits are not expected, the job can be done on the premises by any foundryman who can read a drawing, or copy a broken casting for the making of the one or two required.

Tools Required

Few tools are required. These are: discarded hack-saw blades, a four-sided silicon-carbide rubbing stone, sundry files, a level-face table, contraction rule, set square, calipers, and a scribing block. A blow-lamp is useful where a small drying stove is not continuously heated. The stock-in-trade is slabs of smooth, level-faced core, to various thicknesses, to serve as substitutes for the timber. It is surprising the speed with which a pattern and coreboxes can, where design permits, be built up and put into use; the dry sand pieces are easily stoned, or filed, to accurately-set-out

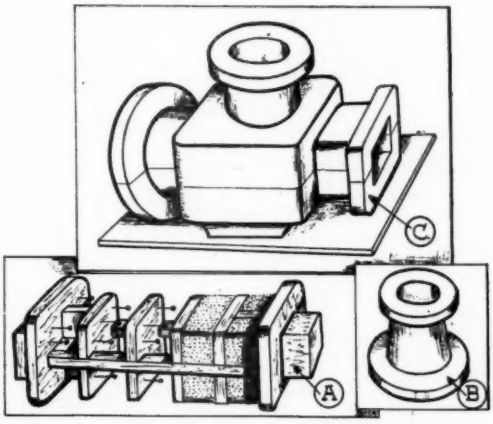


FIG. 1.—(A) SKELETON PATTERN TO BE COMPLETED WITH SAND; (B) CONNECTION CASTING; AND (C) JUNCTION BOX CASTING.

*A Winning Entry for the S. W. Wise Memorial Award organised by the West Riding of Yorkshire Branch of the Institute of British Foundrymen.

Dry-Sand Patterns

shape. A luxury would be one of the thin cutting wheels, used for cutting off risers on castings.

The method includes waterproofing, with hot molten paraffin, or bees-wax painting, or dipping. When cool, the sea-sand pattern becomes of a hardness similar to that of plastics.

Three examples have been chosen for this article: (1) A simple "dozen off" connection casting, shown at B, Fig. 1; (2) a split three-part, loose flange, junction-box pattern, C, and (3) an urgent repair casting, for which no drawing was available, shown in Fig. 7 at O.

Making a Connection Casting

Fig. 2, at D, shows the stock-line of slab cores of various thicknesses, and at E two of the stock of round cores. In this case the half pattern can be fixed on a pattern-plate, so the plate is set out, as shown at F. A piece of flat core is scribed out, as at F, 1, two of these are required for the half pattern, or four pieces if a full pattern is to be made. Core-prints are made in the same way if no round cores be available. For the thicker sections, two or more thicknesses are placed on top of one another; the roughly-cut-out pieces are stoned carefully to a smooth finish and correct shape. The set of parts is shown at F, 2.

To assemble the pieces securely, core-paste, or core-jointing compound, is put on the faces, and the completed job is re-stoved for an hour or so. Alternatively, the well-known cold-setting material for core fixing will speed the job up considerably. This is a semi-paste which dries out in less than one hour, or even more quickly still if used on warm cores or if a blow-lamp be used for a few minutes. Actually, with the use of this material, if a dry-sand pattern be knocked to pieces, it is always other than the jointed faces which come apart. The pieces of core are pasted at the appropriate faces and set into position according to the diagram on the pattern plate. The securing holes for screws are put into the plate first. When the faces and joints are set, the half-pattern is ready for a final check over and a smoothing finish.

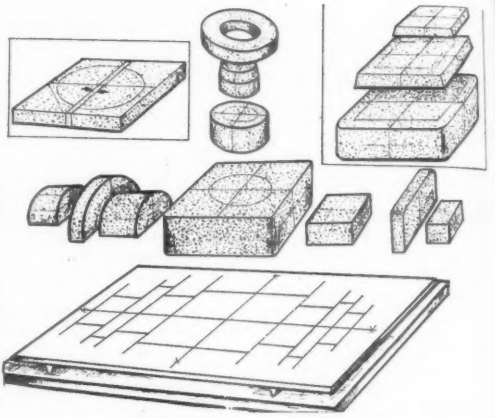


FIG. 3.—PORTS REQUIRED FOR MAKING A SAND PATTERN FOR THE JUNCTION BOX SHOWN IN FIG. 1 (C).

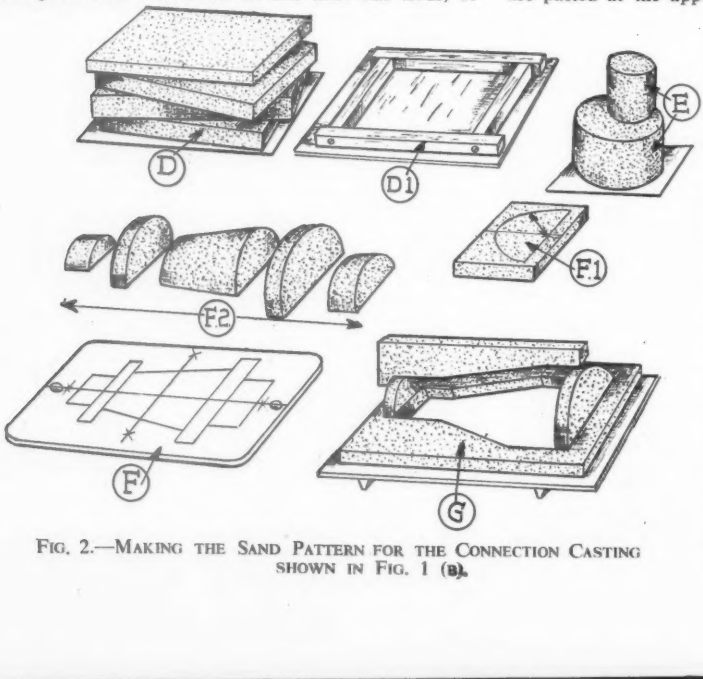


FIG. 2.—MAKING THE SAND PATTERN FOR THE CONNECTION CASTING SHOWN IN FIG. 1 (B).

To provide an extra-smooth skin, a block of paraffin- or bees-wax is melted in a pan and painted on the surface. This molten wax also acts as a grain filler. It will be found that if the core be too hot the wax will continue to sink into the pores of the sand without putting on a smooth skin. By letting either the pattern or the wax cool down somewhat, this penetration can be adjusted till the wax stays on the face of the job.

The bees-wax is the most expensive part of the job, as a pound of molten wax can be quickly absorbed into a hot pattern. By fully immersing a small pattern in a pan of liquid wax, it becomes almost of the

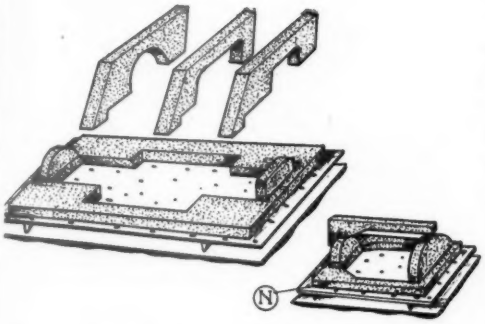


FIG. 5.—FRAME AND STRICKLES TO BE USED FOR THE JUNCTION-BOX CORE.

hardness of a plastic, and will withstand rough foundry usage. Scraping with a sharp knife, before the wax sets hard, will remove all blobs and trickles. If more than one of two castings are wanted, a coat of shellac varnish will make the surface more resistant to sand friction. The foregoing general description applies also to the following examples.

Making a Junction Piece

The core making for the junction piece, illustrated in Fig. 2, at G, is shown as an open bottom-frame and strickle. That is the usual practice for simple, small-order cores and specials. Pieces of slab core are set out and cut to suit, and, as in the previous case, if one piece is not big enough, odds and ends can be stuck on top of each other, as would be done with wood. A coating of wax on the working faces will protect these against the sand when in use. Two half-cores are required for one casting.

For a split pattern made by the same process the two halves are made and assembled. Dowels and holes are put in by a method to be described later. In Fig. 1, at C, is shown a more advanced pattern made by the same process, a three-parted one, having a loose flange, split and dowelled. Used for a "six-off" order, the tolerances are generous, and so long as the flanges machine up to size, other dimensions are not considered important.

Such a pattern can be made in a few hours if the suitable sizes of slabs are available in stock. Fig. 3 shows the component parts and pieces. In some cases two of each piece are required. The diagram is set out, as before, on a level core plate, and afterwards the pieces are cut and stoned to a little over-size, to allow of later finishing. They are assembled and stuck together on the set-out drawing. When set and secure, the half-pattern is removed and the companion half is made the same way. The details will be noted as being complete according to Fig. 4.

Large-diameter, tapered, dowel holes are filed in, as shown at L, Fig. 4. Two round cores are rubbed into the holes to fit (top, left, at J) and a dab of core paste is put on the dowel core face K1. After trueing up the face with a saw blade K, the two half-patterns are put together at dead register and left for a while. When separated, the pin dowel will be secured to the top half. Beeswaxing and smoothing, etc., complete the job. A large-sized rapping hole L1, and lifting screw holes L2, are drilled in before the pattern is put into use. Ordinary wood-screw lifting tackle will not pull

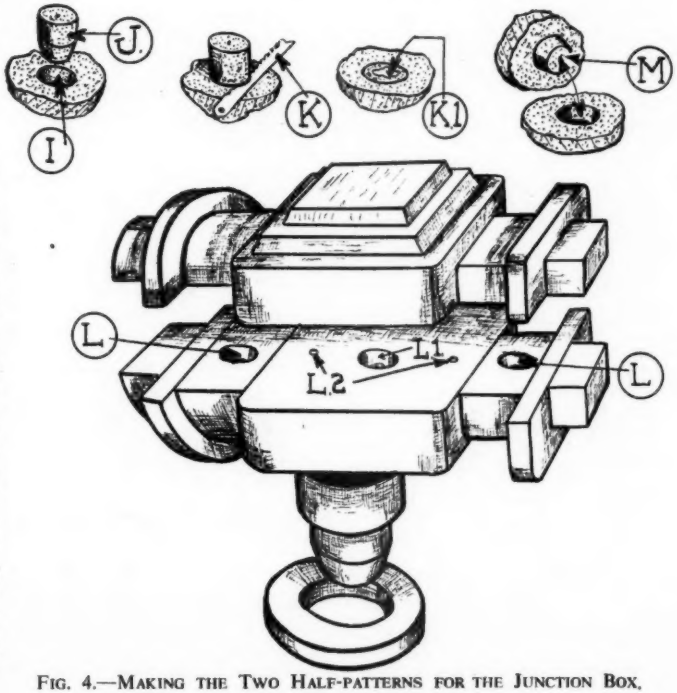


FIG. 4.—MAKING THE TWO HALF-PATTERNS FOR THE JUNCTION BOX.

D

Dry-Sand Patterns

out in use, if the lifting holes be drilled a little under size.

The rapping bar and striker will not shatter the pattern if reasonably light blows are given. When lifting the top half-mould, the top half-pattern has, of course, to be secured in the top in the usual way, owing to the weight of solid sand. Moulding is carried out with the same care as would be given to a wood pattern.

Fig. 5 shows the core frame and strickles, made the same way as set out before, which is usual practice in wood. Where the design is suitable and but few required, the details show all that is necessary to produce a set of cores, as shown in the sketch, Fig. 6. Cinders, core irons (where necessary), vents, etc., can be put in in the usual way. The open-bottom frame permits of its being drawn up over the core, leaving the latter behind on the core plate. The smaller sketch N, Fig. 5, shows the rig-up for the first core in the mould.

An Urgent Repair Casting

To conclude, one example of the use of core pieces to replace wood strips for machining allowances is shown in connection with an urgent repair for a machine-tool item. The casting was used as the pattern. This also is an example of " same-day " delivery. It was expected to be a good casting first time, and the following method was used to mould and pour endwise

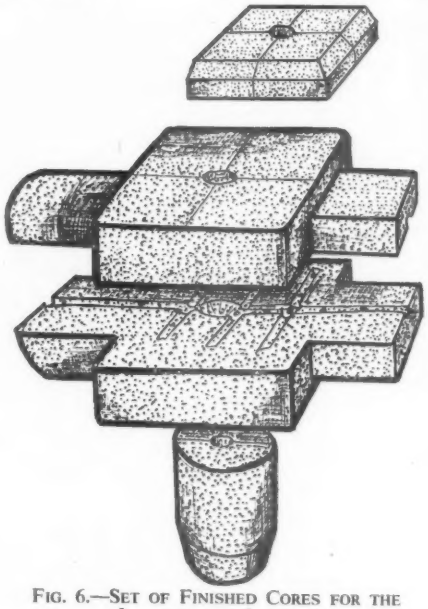


FIG. 6.—SET OF FINISHED CORES FOR THE JUNCTION-BOX CASTING.

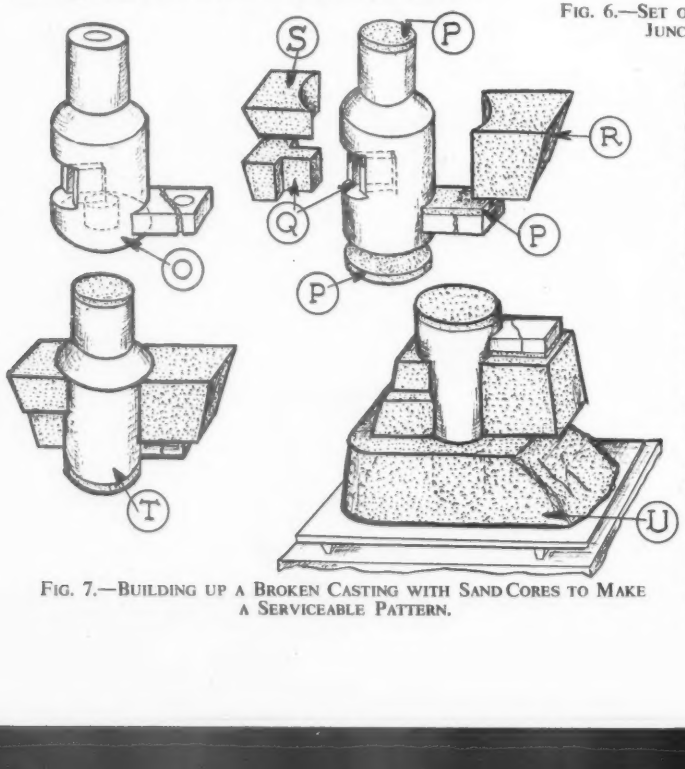


FIG. 7.—BUILDING UP A BROKEN CASTING WITH SAND CORES TO MAKE A SERVICEABLE PATTERN.

to ensure soundness in machining. The broken casting is shown at O, Fig. 7. Extra machining was put on, as at P. A piece of block-core was rubbed to the shape of the slotted hole Q, and another piece R was rubbed to bring up the joint line a few inches. The piece S was made for the same purpose over the core Q. The completed pattern is shown at T.

The whole assembly was turned over on to a core plate covered by a small pile of core sand, as shown at U. The sand was rammed round and under, to a shape to form a cover core. After taking off the pattern and pieces, the cover core was put into the stove to dry. After drying, the pattern and pieces were put back into place on the dried cover core, for the top half to be moulded. This was rammed up in the usual way and rolled over, as shown in Fig. 8. The cover core was then taken out and therafter also the block pieces. The pattern was drawn and the pieces put back in place, as shown at W. The cone

feeder and runners were filed into the cover core and this was replaced in the mould. Finally, the description has been rather brief, but it perhaps seems a little involved; it may, however, point a way in which to meet some of the minor patternmaking difficulties on urgent small-order jobs which are of an importance which does not warrant full-scale work.

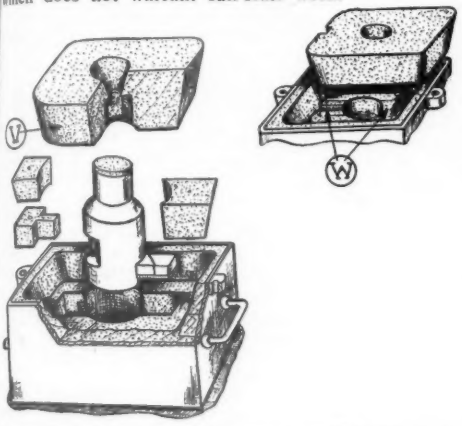


FIG. 8.—METHOD OF MOULDING AND FORMING THE COVER-CORE FOR THE BROKEN CASTING SHOWN IN FIG. 7.

Notes from the Branches

Wales and Monmouth

During April, members of this Branch of the Institute of British Foundrymen visited the Westgate Ironworks of W. A. Baker & Company, Limited, Newport, Mon. Since becoming a subsidiary of the Whitehead Iron & Steel Company, the whole of the offices and workshops have been reconstructed, and they now comprise one of the most modern establishments in South Wales, covering an area of approximately 14 acres.

The company were received by Mr. H. H. Biss, managing director, supported by Mr. J. Lewis, secretary-director, Mr. E. Webb, works director, Dr. Bryn Jones, D.Sc., chief of the research department, Mr. J. F. Davies, works manager's assistant, and Mr. H. Simmons, foundry manager.

Following an address of welcome from Mr. Biss, Mr. W. H. Thomas, Branch-President, thanked him for inviting the members on this occasion. The party was then divided into groups and each group, accompanied by a guide, proceeded to tour the works.

The route included drawing office, patternshop, steelfoundry, ironfoundry, machine- and erecting-shops. Interest in the steelfoundry centred around two high-frequency electric furnaces, the first to be installed in South Wales. The site for the mechanised foundry was inspected, but progress on this building has been unavoidably delayed for lack of necessary material.

Particular interest was shown in the welfare side, which includes surgery, canteens and an ablution station with "hot and cold" wash-basins and showers. Tea was served in one of the canteens, which provided ample accommodation for the 160 visitors and members of the staff.

Moving a hearty vote of thanks to the firm and the directors present, Mr. R. J. Richardson remarked upon the method adopted in effecting the improvements seen, in the way the old shops had been completely demolished and a new set of workshops erected and equipped. The result was seen of an ideal factory and surroundings according to plan, with amenities provided for employees that would be well worth emulation. He was sure that everyone present had spent an instructive and enjoyable afternoon.

Prof. W. R. D. Jones seconded the proposition, which was carried with acclamation.

Mr. Biss replied briefly, expressing his pleasure at being able to provide the opportunity of this visit. He regretted, however, that the picture was not quite complete, the mechanised foundry being still in course of construction. It was, he said, gratifying to see so large an attendance, all keenly interested in what they saw. Mr. Lewis, supporting Mr. Biss on behalf of the firm, remarked upon the presence of so many young members, who had evidently given their Saturday afternoon, in spite of other attractions, to attend this works' visit. It was refreshing to have this example of young craftsmen interested in their work and it was a pleasure to his firm to have been instrumental in maintaining this interest. He wished the Institute and the Branch every success in their work.

An announcement of successful entrants for the Short Paper Competition was then made, as follows:—First prize to Mr. C. Badcock for his Paper entitled "Steel Castings by the Centrifugal Process," and second prize to Mr. J. Greatrex for his Paper entitled "The Control of Foundry Progress."

After Mr. Badcock had read his Paper, he was congratulated by Mr. Kelly, who deemed it to be a progressive contribution in methods of producing sound steel castings. He (Mr. Kelly) was sorry that entries had been so few, but the quality of this Paper was outstanding. The fact that both prize-winners were originally apprentices at Brown Lenox, Pontypridd, was a tribute to the efforts of Mr. Richardson in endeavouring to give every lad in his foundry a full practical and technical training. He looked forward to a greater response in future and hoped that this Paper competition would be an annual event.

The presentation of the second-prize Paper was deferred for a future meeting, and Mr. Thomas brought to a conclusion the afternoon's proceedings.

ELECTROMAGNETS, LIMITED, of 48, High Street, Erdington, Birmingham, 23, have issued two leaflets in connection with the British Industries Fair. One, carrying the caption, contains eight well-chosen illustrations covering their main lines of production. The second one, Leaflet No. PM32, is devoted to setting out the advantages of permanent-magnet plants.

House Organs

The Nickel Bulletin.—The March issue contains an article by R. H. Craig, B.Sc., on the mechanical engineering aspects of the development and manufacture of the cathode-ray tube. Among the abstracts published, those dealing with electrodeposition and other coating methods will be of interest. "The Nickel Bulletin" is obtainable free of charge from The Mond Nickel Company, Limited, Grosvenor House, Park Lane, London, W.1.

Broomwade News Bulletin. March-April, 1948. Published by Broom & Wade, Limited, High Wycombe.

This house organ is published as an aid to the sales department, and as such must be extremely helpful. For instance, the main article describes and illustrates a compressor mounted on wheels, but generally housed in a barge, so that it is equally mobile for servicing ships requiring descaling or painting, either lying off-shore or tied-up.

S. & W. Magazine for May. Published by Smith & Wellstood, Limited, of Bonnybridge.

The technical development chosen for this issue is the installation of two oil-fired crucible tilting furnaces for melting non-ferrous metals. They are used for making aluminium moulding boxes and other foundry equipment. In an article by Mr. J. B. Clarke, there is the interesting statement that the Olga gas cooker made 70 years ago was very similar to the stream-lined production of to-day. S. & W., by the way, have always chosen excellent trading names for their various cookers and stoves.

Book Review

The Amateur's Lathe. By Laurence H. Spasey. Published by the Drysdale Press, Stanbridge, near Leighton Buzzard, Beds. Price 12s. 6d.

For the amateur mechanic, the publication of this book will be received with the same enthusiasm as is a new "Gibbons" by the philatelist. Moreover, it is much more detailed than most of the earlier standard works. For instance, a chapter is devoted to maintenance, an important aspect often forgotten. Really detailed information is given on the choice and installation of the machine, its accessories, necessary equipment and tools. Every job it is possible to carry out—and some the reviewer imagined to be impossible—are well described and illustrated. The Author, being himself an editor, has had access to material not always available to writers on this subject, and has used it to the best advantage. The two-hundred-odd pages carry no fewer than 228 illustrations, all except those showing examples of work done, help towards the easy assimilation of the subject matter. To those of our readers whose hobby it is to run a workshop at home, the purchase of this book is strongly recommended.

V. C. F.

New Catalogues

Automobile Steels. A particularly handsome catalogue covering billets, bars and slabs for the automobile industries has just been prepared by Hadfields, Limited, East Hecla Works, Sheffield. Excellent use has been made of two-colour printing, clear, legible type and artistic layout. The technical information included covers a wide field, is essentially reliable, and has been well chosen.

High-Duty Cast Iron. An eight-page Bulletin No. 28, entitled "7 Questions and Answers About Meehanite Castings," has just been prepared by the Meehanite Metal Corporation, Pershing Square Building, New Rochelle, N.Y., U.S.A. The booklet, by the means of the answering of seven fundamental questions, explains in a concise manner just exactly what Meehanite metal is and outlines the basic characteristics which it provides for industrial users of iron castings. A copy may be obtained on request to the New York organisation.

Factory Planning and Installation. The reviewer was conceited enough to imagine that he was familiar with the multifarious activities of T. W. Ward, Limited, of Albion Works. Sheffield, and elsewhere, yet he confesses that until he received a 22-page well-illustrated catalogue he was unaware that they operated an "F.P.I." department. Moreover, from this catalogue he learned that the firm has much experience in transferring a complete works to a new site, where they arrange the machinery so as to give flow-line production. Pages 2 and 3 outline the scheme they have evolved and the facilities they have assembled for carrying out large-scale projects involving the shifting and re-installation of industrial plant. Following this, a number of interesting examples are cited. Copies of this catalogue are available on writing to the publicity manager at Albion Works.

Special Pig-irons. Ranking amongst the best of the post-war catalogues is a new publication by Sir W. G. Armstrong Whitworth & Company (Ironfounders), Limited, Close Works, Gateshead-on-Tyne. By well-written text, clearly-presented tabular matter and excellent illustrations, the system of selling pig-iron to fixed specifications is admirably disclosed. It is, however, marred by two mistakes. The first is the use on page 3 of a block pull instead of a photograph, resulting in a "double screen" which is ugly. The second is the presentation of a series of micrographs with no indication as to magnification. The reviewer, as a philatelist, has devoted some attention to display, and now is convinced that when the main object is to show stamps, nothing should be done to detract from them. This is a similar case, and on pages 14 and 17 the blue surround is too heavy. The pair on page 12 are much better. The catalogue is available to our readers on application to the Publicity Manager at the Gateshead Works.

Nodular Cast Iron

Potentialities of Magnesium

A Paper on this subject by MORROUGH and WILLIAMS, read before the Iron and Steel Institute on May 5, brought about an interesting discussion. It was opened by DR. L. B. PFEIL, who mentioned that some work of the research staff of the International Nickel Company, Limited, had shown the merits of magnesium as a neutraliser of sulphur. They had therefore studied the effect of magnesium on cast iron and had worked out a process somewhat similar to the authors'. A magnesium-containing alloy was added to the iron in the ladle. This was quite practicable under ordinary commercial conditions. A first addition brought about desulphurisation, a second addition gave an intermediate structure and further additions a nodular graphite. Tensile strength and impact resistance increased with successive additions, and with low-phosphorus iron there was a certain degree of ductility. By heat-treatment, "a quite reasonable elongation" could be obtained. All this meant, in effect, that a new alloy was produced; it remained to translate the idea into practice.

MR. N. M. HALLETT, M.Sc. (Sheepbridge Stokes), believed that the Paper by Morrogh and Williams was an event in the cast-iron world, but felt that the increased knowledge it presented on graphite formation was even more important than the extra tensile strength given by the process. He quoted the results of some experiments in which *mischmetall* was added to molten iron. Sand-cast bars, $\frac{1}{4}$ in. dia., were poured as well as some centrifugal castings made in metal dies. Tensile strength was determined on ring-form specimens and micro-examination was used to establish the form of the graphite and the approximate percentage of ferrite in the castings. Adding 25 grms. *mischmetall* per 100 lb. of iron, he had obtained flake graphite and 7 per cent. ferrite in the $\frac{1}{4}$-in. bars,, quasi-flake graphite and 15 per cent. ferrite in the centrifugal castings and 29 tons per sq. in. tensile strength in the ring-form test-pieces. Subsequently 35 grms. per 100 lb. had been added, with the following results:—$\frac{1}{4}$-in. sand-cast bars, flake graphite, 20 per cent. ferrite; centrifugal castings, quasi-flake graphite, 60 per cent. ferrite, and ring-form specimens, 53 tons per sq. in. In a final test, 45 grms. *mischmetall* was added per 100 lb. iron, giving results as follow:—$\frac{1}{4}$-in. bars, nodular graphite, 50 per cent. ferrite; centrifugal castings, nodular graphite + carbide, 10 per cent. ferrite; ring-form specimens, 38 tons per sq. in. tensile strength. More rapid cooling in effect thus replaced part of the cerium.

An Antique Casting

MR. K. H. WRIGHT commented that, in the past, much ignorance of cast iron had been disguised by speaking of "the inherent property of pig-iron." Thus, such questions as why does one iron chill more easily than another?—why does one alloy give a coarse mottle and another a fine?—and how can a very thick section undercool?—might all be solved by the work on nodular iron. The speaker thought that sulphur had a great effect. He mentioned an examination he had made of a cannon cast about the time of Lord Nelson. This had the following composition: Total carbon, 3.88; combined carbon, 0.68; Si, 0.25; S, 0.036; P, 0.96, and Mn, 0.51 per cent. Such an iron, in a 1-in. section, would nowadays be mottled, although Mr. Wright's examination showed it to be grey. Some such element as magnesium, calcium or cerium must have been present. If sulphur were soluble in iron carbide, it might affect the rate of decomposition. The speaker asked about the form in which cerium is combined in special irons. German workers had suggested that CeC_3 might break down exothermally to CeC_2 and carbon which might serve as a nucleus for the formation of spherulitic graphite.

MR. C. A. PAYNE, B.Sc. (Qualcast, Limited), discussed the mode of occurrence of carbon in molten iron. It might be present as carbon or as iron carbide; possibly temperature would have some effect. Pouring temperature might have similar effects to those of alloying elements in iron-carbon alloys. Mr. Payne mentioned the phenomenon of inverse chill and suggested that it might represent a segregation of cerium towards the last part to solidify.

MR. R. J. BROWN (Nuffield Research Centre) showed a series of lantern slides illustrating varying forms of graphite in cast iron.

Correspondence

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

VITREOUS ENAMELLERS' SPRING CONFERENCE

To the Editor of THE FOUNDRY TRADE JOURNAL

SIR,—This is a special appeal on behalf of the Council of the I.V.E. for support for the Spring Conference, which the Council have gone to great trouble to convene in the interests of the Enamelling Industry. Many troubles arise in producing vitreous enamel finishes due both to processing and material, and the Institute exists to serve the industry.

Arrangements have been made during this conference for Papers to be given, by highly skilled lecturers, on the cleaning of metal for enamelling, which is the cause of much present-day difficulty; also a lecture and film on "Development of Defects in Vitreous Enamel"; with a works visit to a very modern plant; and there will be a question box which is open to all for discussion; answers and advice are given freely by the best brains in the Enamelling Industry.

Additionally to this is the opportunity, which only occurs in a major degree at the Spring and Annual Conferences, for all enamelling technicians to discuss problems with which they, personally, are faced. The closing date of May 1 for all reservations disclosed the fact that the Council *have arranged for receiving larger numbers than the present acceptances indicate.*

Will members, therefore, immediately, if they have not already done so, make their reservation to the Honorary Secretary (Mr. W. Thomas), Ebury Chambers, 74, High Street, Rickmansworth, Herts.

Yours, etc.,

on behalf of the Institute of Vitreous Enamellers,
C. P. STONE (Chairman of Council).

New Foundry at Bangor

Sykes & Harrison, Limited, of Manchester, established a new foundry at Bangor, in North Wales, in March, 1947, in some very old buildings formerly used for slate cutting. A representative of the FOUNDRY TRADE JOURNAL, who visited the foundry recently, found the new enterprise well established, although not so much progress as had been hoped for had been made, mainly owing to the difficulty in securing plant and material needed to turn the site into a modern foundry.

A labour force of around 100 is employed. A few key men were brought from Manchester, but the rest of the employees were drawn from the ranks of local labour and have been trained by the firm. It was not possible to start training the moulders and other workers until May of last year. Melting started in June, and the management had hopes that they would have a modern, fully mechanised foundry in operation within two years. This hope is still entertained, but the reconstruction is behind on time schedule owing to the difficulty in getting steel and other materials. The cupolas needed should have been installed last August, but could not be obtained in time. The firm consequently secured the material and built a cupola themselves. They are finding themselves, in fact, compelled to make a good deal of the equipment they require. A second cupola is on order.

There is a considerable amount of unemployment in North Wales, and the establishment of a foundry at Bangor was welcomed by the Ministries of Supply and Labour and other Government departments. Our representative was told that the men engaged had fitted into the work very well and had rapidly gained proficiency. The scrap-castings figure of 5 per cent. which we were given would seem to testify to this. Mr. S. C. Harrison, the managing director, told us that it is the intention to undertake specialist production in batches. From their point of view the ideal figure would be batches of 350 castings, but they expect to work between the range of 25 and 1,000 castings of a kind. Full production must, however, wait upon a completion of essential structural alterations. The final layout visualises a number of self-contained bays, one of the bays to be used as a mould store. Only high-duty iron castings will be made. Work at present in hand includes castings for the National Coal Board, agricultural machinery castings, and switchgear castings. About 50 per cent. of the present production goes for export.

THE REFLECTOMETER, which is shown at the British Industries Fair by Evans Electroselenium, Limited, Harlow, Essex, was originally designed for the Paint Research Station. It enables the industrial chemist to match coloured surfaces to a standard shade, or to deviate to any predetermined degree. Based upon the amount of light reflected from a coloured surface, and measured accurately by selenium cells, this equipment entirely eliminates the human error and eye fatigue present with visual inspection.

The Aluminium Development Association

The Annual Report for 1947 states the association has now completed the first year in its new headquarters at 33, Grosvenor Street, London, W.1.

The Library and Information Department has continued to provide data direct to external enquirers and to members of the staff dealing with enquiries or with Committee work. During the year there were 1,260 additions to the library, bringing the total items available to more than 5,000. The journals and periodicals regularly received number nearly 140. Loans to external enquirers totalled 1,240 during the year, and the library dealt with over 300 substantial technical enquiries as well as with many minor enquiries from outside sources.

In addition, a number of new lantern slides were made, bringing the collection to almost 700. A classified list of slides was issued early in the year and nearly 300 slides were lent to members and others. The Library is also building up a collection of photographs showing all aspects of aluminium alloy production and fabrication as well as applications. Over 100 photographs from the present collection were lent to various enquirers during the year.

The gradual building-up of a specialist library on all aspects of aluminium is an essential service to all industries employing the metal, to research organisations and to Government Departments. The increasing number of loans is evidence that this service is meeting a real need, but it is also apparent that full advantage of these facilities is not yet taken.

The Library is also responsible for issuing technical memoranda after approval by the appropriate Sub-Committees for which the documents are originally prepared. This new series of Association publications totalled 27 during the year, some of which were issued to member companies for their confidential information, the others (for example translations) being made available for any interested enquirers.

In addition to the enquiries dealt with by the Library and Information Department, many others are answered by the technical staff and the total number answered during 1947 was approximately 4,650.

Enquiries are divided broadly into two groups—technical and development enquiries which cover problems of production and fabrication of aluminium alloy articles, the design of aluminium structures and new applications, and trade enquiries which are largely requests for the names of suppliers of particular materials or products. The number of technical enquiries recorded during the year amounted to 3,250, and this should be compared with the figures for previous years.

THE PHOTO-ELECTRIC CELL is now being used for controlling the firing by powdered fuel of furnaces for malleableising and other purposes. Better control and improved efficiency are reported. We have previously reported the use of these instruments for registering the production and stoppage of moulding machines.

The Constant-charge System of Cupola Operation*

By W. W. Braidwood

(*Concluded from page* 439.)

Base Cupola Metal Modified by Spout Additions to suit a Range of Castings

Recommended Cupola Practice

The cupola should be operated in accordance with recognised standards of good practice, the main features of which may briefly be recounted. After proper repair of the lining, etc., the bed should be kindled and allowed to burn until incandescent throughout. It should then be poked to ensure compactness before fresh coke is added to restore its height to the recommended level of at least 36 in. above the top or main row of tuyeres. This should be done immediately before commencement of charging.

Each constituent of every charge should be accurately weighed, the unit charges should be relatively small, and charging should be carried out with care, everything possible being done to ensure uniform distribution, layer by layer. Fast, uninterrupted melting is ideal, and the cupola should be operated so as to melt at least 10 lb. per hour for each square inch of area at the melting zone. Table III summarises the main recommendations which should be observed wherever practicable.

The unit charges recommended are smaller than those normally used, and it is realised that in many instances it would be difficult to employ properly-weighed charges of the order quoted. Nevertheless, the unit charges should be kept as near as possible to the stated ranges in order to promote uniformity of the tapped metal and efficient operation of the cupola.

Control Methods

Some form of empirical test is essential, and the procedure adopted should be simple, reliable, rapid and inexpensive. The most popular specimen is the wedge test-piece poured in an oil-sand mould. The dimensions should be such as will suit the range of castings to be poured. Most foundries are able to exercise adequate control by the use of a single, standard wedge, but in some instances more than one specimen will be necessary. Details of the wedge tests most usually conducted are listed in Table IV, Fig. 5 shows the fractures of a group of wedge and chill-block test pieces after different treatments.

Alternatives to the wedge specimen are test-pieces of the "forced-chill" type. These are poured in composite moulds formed by oil-sand blocks set on or within chills; they range in design from the very thin wafers favoured in foundries producing light-section castings, to the 1-in. thick blocks suitable for control of castings of heavy engineering type. Other designs of test-piece include the stepped bar and variations thereof. An excellent study has been made of visual test methods by Sub-Committee T.S.6 of the Technical Council of this Institute.[1] This should be consulted for details of mould-design, methods of conducting tests, aids to measurement, etc. Each foundry commencing use of the constant-charge system should adopt that single specimen or small number of specimens best suited to its normal range of castings.

TABLE IV.—*Details of Wedge Tests Used.*

	Test-piece.			Casting sections suited.	Approx. time required to complete test.
	Base.	Height.	Length.		
(*a*)	½ in.	⅞ in.	4 in.	Up to 1½ in.	40 seconds
(*b*)	¾ in.	1½ in.	5 in.	Up to 2½ in.	1 minute
(*c*)	1 in.	2½ in.	5 in.	Up to 4 in.	1½ minutes

Control Procedure

The consistency of the as-tapped metal should be checked at regular intervals throughout each melt. Any variations from normal chilling characteristics can then be noted and adjustment of the normal additions and/or the subsequent charges be made accordingly.

FIG. 6.—GROUP OF THREE TURBO-GENERATOR CASTINGS.
(Courtesy of Renshaw Foundry, Ltd.)

* Presented to the East Midlands Branch of the Institute of British Foundrymen and elsewhere.

Constant-charge Cupola Operation

Samples should, of course, be taken from the treated metal also, particularly in the case of that scheduled for pouring of the thinnest castings. With a suitable design of specimen, the test can be carried out with sufficient rapidity to give the reading before pouring is commenced. In the event of any metal being found unsuitable, it may be given further treatment or used for the pouring of more appropriate castings. With well-established and carefully-controlled procedure, however, such a happening should be very much more the exception than the rule.

Typical Arrangements

The process calls for production, at the tap-hole, of an iron of unvarying type, suitable for pouring of the heaviest-section castings normally made. For convenience this may be termed the "base" iron. This iron is modified, as required, to suit lighter-section and special-purpose castings. The possible variations are almost innumerable, but the soundest arrangement is to schedule the smallest adequate number of subsidiary grades and identify these by simple symbols. Castings in production can then initially be placed in their appropriate categories and processed accordingly. At this point it should be emphasised that inoculated irons, such as these subsidiary grades, have a greater latitude than non-inoculated irons, that is to say, a single iron so treated can be used successfully to pour a greater range of castings than a single iron not so treated. Usually all needs can be met by several separately-identified grades.

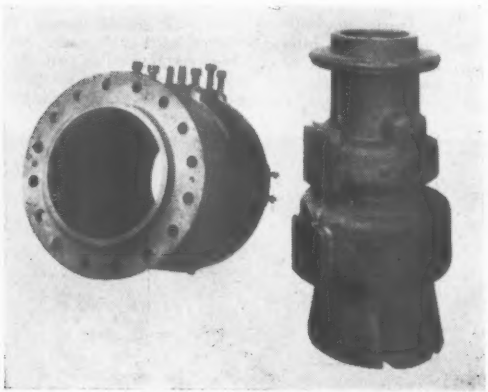


FIG. 7.—CYLINDER FOR AMMONIA COMPRESSOR. WEIGHT AS-CAST, 22 CWTS.

Test pressure—600 lbs. per sq. in. hydraulic.
Test pressure—350 lbs. per sq. in. air.

(Courtesy of J. & E. Hall, Ltd.)

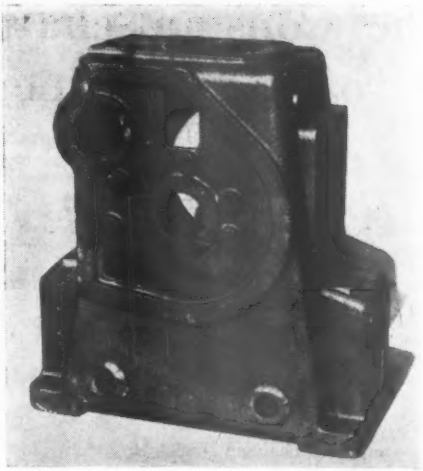


FIG. 8.—CRANKCASE, MACHINE MOULDED. WEIGHT, 50 LBS. (UN-ALLOYED, INOCULATED.)

(Courtesy of Lloyds (Burton), Ltd.)

A supplementary note† will describe the procedure actually employed in one of the foundries operating the system. The present Paper will set out a typical arrangement, applicable to the majority of foundries.

Let it be assumed that one is required to plan a schedule to suit a foundry with a throughput of approximately 20 tons per day, normally allocated as shown in Table V.

TABLE V.—*Schedule for a Foundry Casting 20 Tons per Day.*

Type.	Section thickness.	Daily demand.
Engineering castings to B.S.S. 786 grades, 2, 3 and 4:		
Structural—Heavy	2½–4 in.	2 to 4 tons
Medium	¾–2½ in.	6 to 10 „
Light	Under ¾ in.	1 to 2 „
Pressure—Medium	¾–2½ in.	2 to 3 „
Light	Under ¾ in.	1 to 2 „
Miscellaneous engineering castings to B.S.S. 321, Grades A and C:		
Structural—Miscellaneous	All ranges quoted above	3 to 4 tons

Following the recommended procedure, one would compile the standard charge to suit the requirements of structural castings of section-thickness ranging from 2½ to 4 in. Table I gives the desired silicon content of the tapped metal as approximately 1.2 per cent.

† "Notes on the Practice at the Argus Foundry," by A. Jamieson. Printed in this issue, page 471, *et seq.*

From consideration of the fact that about 20 per cent. of the output consists of pressure castings, it would be preferable to use fine-grained pig and to select the best available materials. Moreover, since there is a fair quantity of light-section castings to be produced, it would be preferable to keep the steel-scrap content of the charge at a moderate level, say 20 to 25 per cent.

The selected charge would, therefore, be composed approximately as under:—

	Per cent.
Low-phosphorus refined iron	25 to 30
Suitable low-phosphorus B.F. pig ...	20 to 15
Selected steel scrap	25 to 20
Own returned scrap	30 to 35

plus any required additions of high-silicon pig, ferro-silicon, ferro-manganese, etc. A simple arrangement could then be made as shown in Table VI, which is self-explanatory.

A scale of additions is given in Table VII.

FIG. 9.—REAR-AXLE CASING, MACHINE MOULDED; 185 LBS.; NICKEL-CHROMIUM CAST IRON.
(Courtesy of Lloyds (Burton), Ltd.)

TABLE VI.—*Schedule for a Range of Castings.*

Grade (base).	C, per cent.	Si, per cent.	Mn, per cent.	S, per cent.	P, per cent.	Ni, per cent.	Cr, per cent.	Mo, per cent.	
H.2*	3.2	1.2	0.8	0.10	Max. 0.25 pref. lower	Low†	—	—	Structural castings to 786-2. Sections over 2½ in.
M.3	3.2	1.2	0.8	0.10	,,	1.25	—	—	Pressure castings and all structural castings to 786-3 Sections over ¾ in.
M.4	3.2	1.2	0.8	0.10	,,	1.25	—	0.5	As above to 786-4.
M.2	3.2	1.7	0.8	0.10	,,	Low†	—	—	Structural castings to 786-2. Sections ¾ in. to 2½ in.
L.3	3.2	1.7	0.8	0.10	,,	1.25	—	—	Pressure castings and all structural castings to 786-3. Sections up to ¾ in.
L.4	3.2	1.7	0.8	0.10	,,	1.25	—	0.5	As above to 786-4.
L.2	3.2	2.2	0.8	0.10	,,	Low†	—	—	Structural castings to 786-2. Sections up to ¾ in.

Legend.—H = Heavy section. M = Medium section. L = Light section. 2 = B.S.S. 786, Grade 2. 3 = B.S.S. 786, Grade 3. 4 = B.S.S. 786, Grade 4.

* Preferably inoculated with lump electrode carbon. † Actual amount dependent on proportion of alloyed iron in production.

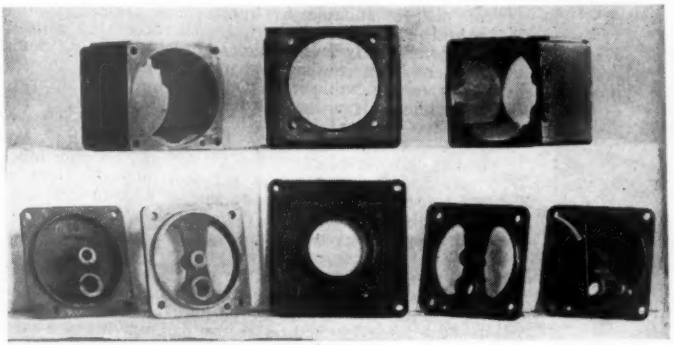


FIG. 10.—GROUP OF CASTINGS FOR BRENTFORD MECHANICAL LUBRICATOR. (UNALLOYED 2.2 PER CENT. SILICON.)
(Courtesy of Tecalemit, Ltd.)

An alternative arrangement would be to charge two separate mixtures giving silicon contents of approximately 1.2 and 1.7 per cent. respectively. This modification would effect some saving in inoculants, but would render the procedure less simple and much less elastic. Foundries normally required to produce a substantial proportion of their output to B.S.S. 321, Grades A and C, or to no definite specification, could, of course, first melt a phosphoric cast iron for the pouring of the ordinary castings, followed by the special constant charge to deal with all of the better-quality castings. Careful segregation of phosphoric from low-phosphorus scrap would be essential.

Special irons of distinct type, also readily producible by suitable

Constant-charge Cupola Operation

TABLE VII.—*Showing Scale of Additions.*

To give :—		
0.5 per cent. Si ..	Fe-Si (75 per cent. Si) ..	12 ozs. per cwt.
	" Sil-X "	20 " "
	" Type B " Ni-Si	30 " "
	(Gives simultaneous addition of 1.0 per cent. nickel.)	
1.0 per cent. Si ..	Above additions doubled.*	
1.25 per cent. Ni..	" F " Ni shot	24 ozs. per cwt.
	" Type B " Ni-Si	38 " "
	(Gives simultaneous addition of 0.6 per cent. Si.)	
0.5 per cent. Mo	Fe-Mo	13 ozs. per cwt.
0·5 per cent. Cr ..	" Chrom-X "	20 " "
	Fe-Cr	14 " "

*With adjustment if " Type B " Ni-Si be used

addition to the base iron, are:—

Low-alloy heat-resisting—1.25 per cent. nickel, 1.0 per cent. chromium.

Heat-treatable cast irons—2 to 3 per cent. nickel, 0 to 7 per cent. chromium.

With adoption of special preheating procedure, castings of suitable design could be produced in:—

Martensitic grey cast iron—4.0 to 5.0 per cent. nickel.

Figs. 6 to 11 show castings produced by single-mixture systems and illustrate typical applications. The

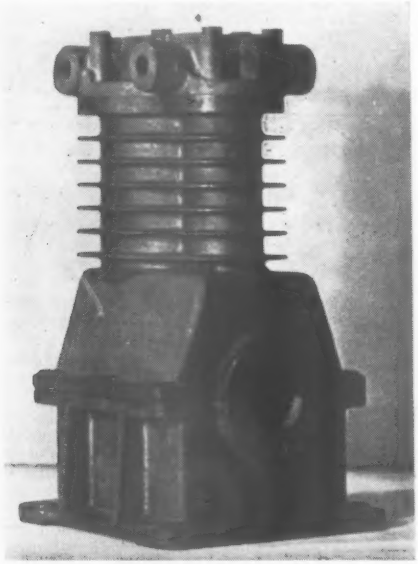


FIG. 11.—AIR COMPRESSOR ASSEMBLY. (1.4 PER CENT. SILICON, 1.4 PER CENT. NICKEL.)
(Courtesy of Tecalemit, Ltd.)

Author wishes to emphasise that he makes no claim with regard to origination of the process. The constant-charge, or " single base mixture," system was apparently first applied in the U.S.A. and was mentioned in a Paper written in 1943.[2]

Credit for pioneering of the procedure in this country is mainly due to Mr. A. E. McRae Smith.[3]

Data and illustrations have been provided by the following firms:—Argus Foundry, Limited, Glasgow; John Fowler & Company (Leeds), Limited, Doncaster; J. & E. Hall, Limited, Dartford; Lloyds (Burton), Limited, Burton-on-Trent; Renshaw Foundry, Limited, Staines, and Tecalemit, Limited, Brechin. Their courtesy and co-operation are gratefully acknowledged.

REFERENCES.

1 " Control Tests for Grey Cast Iron," Proc. Inst. Brit. Foundrymen, 1945/6, XXXIX, A.28-A.51.
2 J. S. Vanick, " Trends in Iron Foundry Metallurgy," Metal Progress, 1944, XLV, 83-85.
3 A. E. McRae Smith, " The Year's Progress in the Production and Application of Alloy Cast Irons," Metallurgia, 1946, XXXV, 93-96.

AMENDMENT.

In the discussion which followed presentation of this Paper at Loughborough, it was pointed out that fair cost comparison could be made only where the figures related to the respective purchased materials—that is to say, no account should be taken of foundry returns.

The Author agrees that this is a legitimate objection, and states that Table II, therefore, requires modification as follows:—

(*a*) 14 cwts. purchased materials ...	£5 4s. 11d.
(*b*) 14 cwts. purchased materials ...	£5 14s. 9d.
Difference in cost of 14 cwts. of purchased materials	9s. 10d.
Difference in cost per ton	14s. and not 10s. as stated in Table II.

Embellishing the Canteens

It was to us a revelation to learn from the Industrial Welfare and Personnel Management Service Bulletin No. 26, issued by the Council of Ironfoundry Associations, that there were available such a wide selection of pictures suitable to transform a canteen from a sordid eating house into a well decorated *salle à manger*. Thirty-seven sources are listed, and we doubt if there is more than a handful which will show a profit to the publishers. One " picture " we deem to be essential is a local ordnance survey map. When time has lowered interest in the majority of the pictures, people will still be fascinated by maps. We dislike the use of canteen walls for any purpose other than that of decoration or personal interest. Here, of all places in the works, one should be transferred, as far as is possible, to a domestic atmosphere of the highest possible level.

A WELCOME VISITOR to this office last week was Mr. H. G. Issels, of Bulawayo, Southern Rhodesia, son of the founder of the engineering and founding firm of F. Issels & Sons, Limited. His firm has now become associated with the Firth-Brown Group. He has been a reader of the JOURNAL for at least thirty years. In his father's early days it took five months to travel from Bulawayo to Johannesburg; now it takes 2½ hours by air.

Institute Elects New Members

At a meeting of the Council of the Institute of British Foundrymen, held at the Midland Hotel, Derby, on April 17 the following were elected to the various grades of membership:—

FIRST LIST

As Subscribing Firm Members

Bairds & Scottish Steel, Limited, Gartsherrie Iron Works, Coatbridge, pig-iron, coke and cement manufacturers (representative, Mr. Robert Allan); W. S. Craster, Limited, P.O. Box 336, Salisbury, Rhodesia, S. Africa, engineers and founders (representative, T. Y. Craster); J. Lynn & Company, Limited, Pallion, Sunderland, marine engineers and ironfounders (representative, Harold White); Steel Company of Wales, Limited, P.O. Box 9, Port Talbot (representative, C. J. Burgess).

As Members

A. Arstal, managing director, Foss Jernstoperi, Norway; R. Bell, works manager, Widnes Foundry & Engineering Company; D. G. Bisset, managing director, Enfield Foundry Company, London; P. A. Dracup, shift manager, Alloy Steelworks, Bradford; E. W. Fell, Dr.Ing., MSc., metallurgist, Bradford Technical College; E. L. Graham, development engineer, Coneygre Foundry, Limited, Tipton; D. R. Griffin, managing director, Atlantis Engineering Company, Limited, Lewisham; J. P. Grosscurth, managing director, Strande Foundry Products, Limited, Cookham; A. G. Hancock, foundry foreman, J. Heathcoat & Company, Tiverton; J. J. Harvey, managing director, Harvey & Longstaffe, Limited, Manchester; M. B. Hill, chief chemist and metallurgist, Vulcan Foundry. Newton-le-Willows; A. Hughes, foreman moulder, Richard Thomas & Baldwins, Limited, Landore; T. Jones, foreman moulder, Richard Thomas & Baldwins, Limited, Swansea; S. Kay, director, Cooper Roller Bearings Company, Limited, King's Lynn; A. W. Kurstjens, foundry manager, Ijzergieterij "De Globe," Holland; Jean-Paul Laurent, engineering designer, Stanmore Engineering Company, Stanmore; W. H. Lippett, chief planning engineer, Massey-Harris, Limited, Manchester; G. Meggison, technical adviser and development officer, Tatanagar Foundry Company, Limited, Bihar, India; R. Y. Peacock, foundry foreman, Ellerby Foundry Limited, Leeds; J. C. Prytherch, Ph.D., M.Sc., metallurgist, Tin Research Institute, Greenford; B. P. T. Rosevere, foundry manager, Marsh & Young, Limited, Dunstable; V. Thomas, chemist, Williams Alexandra Foundry, Cardiff; F. B. H. van Bergen, metallurgist, Ijzergieterij "De Globe," Holland; J. G. Woodruff, works manager, Elliott Bros. (London), Limited; W. G. Young, foundry manager, Stanton Ironworks, Limited.

Transfers from Associate Member to Member

W. L. Beasley, foundry superintendent, F. H. Lloyd & Company, Limited, Wednesbury; D. Carrick, foundry superintendent, Crane, Limited, Ipswich; W. R. Harrison, foundry manager, Bagshawe & Company, Limited, Dunstable; C. W. Hawkins, works manager, Dover Engineering Works; G. McKinlay, foundry foreman, Goulds Foundries, Limited, Cardiff; H. Morton, assistant works manager, Sheepbridge Stokes Centrifugal Castings, Company, Limited, Chesterfield; E. S. Renshaw, metallurgist, Ford Motor Company, Limited, Dagenham; W. Wearing, foundry manager, Chaseside Engineering Company, Limited.

As Associate Members

R. Allen, deputy foreman, Sir J. Farmer Norton, Manchester; A. Anderson, works chemist, Mitchell Russell & Company, Limited, Falkirk; A. C. Bird, foundry manager, Davy & United Roll Foundry, Middlesbrough; J. Brook, foundry foreman, Glover & Wood, Limited, Leeds; A. T. Brown, patternmaker foreman, British United Shoe Manufacturing Company, Leicester; A. Bulloch, metallurgist, R. Taylor & Company, Larbert; S. Burrows, foundry manager, Tecalemit, Limited, Brechin; W. J. Buttress, castings buyer, A. Reyrolle & Company, Limited, Hebburn-on-Tyne; J. Carter, foundry foreman, Head Wrightson & Company, Stockton; C. Campbell, Stone-Wallwork, Limited, London, F. S. Cooperwaite, patternmaker, R. Taylor & Company, Larbert; R. Culling, patternmaker, Qualcast, Limited, Derby; T. Cummins, patternmaker, Wilson's Forge (1929), Limited, Bishop Auckland; J. T. Davenport, assistant manager, Carntyne Steel Castings Company, Renfrew; W. Dibble, foundry foreman, F. H. Lloyd & Company, Wednesbury; T. Duggan, assistant foundry foreman, Widnes Foundry & Engineering Company, Limited; J. Duggan, foreman moulder, Widnes Foundry & Engineering Company, Limited; A. W. Ewing, foreman patternmaker, J. Wright, Limited, Birmingham; W. Fawcett, charge-hand, Hepworth & Grandage, Bradford; A. Ford, foreman moulder, Cochranes, Limited, Middlesbrough; J. Frost, foundry manager, Qualters & Smith Bros., Limited, Barnsley; J. A. Gapski, sand laboratory technician, Coneygre Foundry, Limited, Tipton; J. R. Gault, B.Sc., metallurgical chemist, Shaw Glasgow, Limited, Glasgow; R. B. W. Greenhorn, foundry manager, Light Castings (Pty.), Limited, Benoni, South Africa; J. C. Hannan, metallurgist, B.I.S.R.A., London; L. A. S. Harbourne, M.C., technical representative, Morgan Crucible Company, Limited, Battersea; J. J. Harper, assistant to metallurgist, Widnes Foundry & Engineering Company, Limited; T. R. Millar, assistant foundry superintendent, Babcock & Wilcox, Limited, Renfrew; D. H. Mackie, foundry foreman, Hillside foundry Company, Cupar; A. M. Howie, production shop foreman, Globe Engineering Works, Capetown; J. A. Hufton, engineer in charge, Stone-Wallwork, Limited, London; L. Hylton, charge-hand, Hepworth & Grandage, Limited, Bradford; A. Ives, under-manager, Frank Ives, Huddersfield; R. J. Joyce, metallurgical chemist, Wynn, Limited, Cannock; L. Kreuzer, works director, Bilston Foundries, Limited; D. Lee, charge-hand, Hepworth & Grandage, Limited, Bradford; A. Lydall, foreman moulder, Walsall Foundry; T. May, foundry foreman, Gravel Gate Foundry, Oldham; J. C. Meikle, foundry foreman, John Wright & Company, Birmingham; F. Middleton, foreman moulder, Howard & Bullough, Limited, Accrington; A. C. Mookherjee, assistant foreman, Indian Iron & Steel Company, Limited, Kulti; A. A. Muddle, assistant metallurgist,

Institute Elects New Members

Lake & Elliot, Limited, Braintree; K. Oldershaw, laboratory assistant, Stanton Ironworks, Limited; W. B. Pamment, production engineer, Crane, Limited, Ipswich; G. Cherry Paterson, B.Sc.(Eng.), mechanical engineer, Paterson Hughes Engineering Company, London; L. Ravenscroft, charge-hand, Hepworth & Grandage, Limited, Bradford; L. J. Ruddick, assistant foreman, Cochranes' (Middlesbrough) Foundry, Limited; J. Smith, brass moulder, Gresham & Craven, Limited, Manchester; James Stevenson, foreman patternmaker, Shanks & Company, Limited, Barrhead; K. Steiner, foundry sand technician, F. H. Lloyd & Company, Limited, Wednesbury; J. M. Thornton, metallurgical chemist, Bonnington Castings, Edinburgh; W. Trotter, assistant foreman moulder, North British Steel Foundry, Limited, Bathgate; R. E. Wallwork, metallurgist, H. Wallwork & Company, Limited, Salford; W. Watson, foreman moulder, G. M. Hay, Limited, Glasgow; L. W. Wigley, assistant to managing director, Glynn Engineering Works, Pontypool; J. Wilcox, foundry foreman, J. T. Price & Company, Limited, Stoke-on-Trent; A. E. Wiles, metallurgist, Summersons Foundries, Limited, Darlington; L. Wilson, foundry manager, James Wilson, Huddersfield; W. H. Wilson, foreman moulder, Davy & United Roll Foundry, Limited, Middlesbrough.

Transfers from Associate to Associate Member

E. Bramble, assistant foundry metallurgist, C. A. Parsons & Company, Limited, Newcastle; S. Burrell, technical assistant to foundry manager, English Electric Company, Limited, Bradford; J. V. Faulkner, foundry foreman, W. A. Bakers, Limited, Newport; J. Richman, development engineer, Millars Machinery Company, Limited, Bishop Stortford; S. Walker, iron and steel moulder, Dorman, Long & Company, Limited, Middlesbrough.

As Associates (*over* 21)

J. Andrews, inspector, Hayden Nilos, Limited, Sheffield; A. Fraser, metallurgist, Glenfield & Kennedy, Limited, Kilmarnock; T. Haig, moulder, Jas. Wilson, Huddersfield; D. G. Kulkarni, apprentice moulder, E. W. Wynn, Limited, Cannock; C. S. Lines, senior draughtsman, Stone-Wallwork, Limited, London; E. H. Mason, draughtsman, Stone-Wallwork, Limited, London; H. Peel, patternmaker, Sarginson Bros., Limited, Coventry; W. T. Robinson, foreman patternmaker, C. A. Parsons & Company, Limited, Newcastle; C. A. Ward, draughtsman, Stone-Wallwork, Limited, London.

As Associates (*under* 21)

P. Baron, apprentice moulder, Petrie & McNaught, Rochdale; J. Crossley, foundry apprentice, Whitehead & Poole, Limited, Radcliffe; G. W. Nicklin, foundry apprentice, F. H. Lloyd & Company, Limited, Wednesbury; J. Phillipson, moulder, C. M. Hesford, Limited, Ormskirk.

SECOND LIST

As Subscribing Firm Members

Engineering Enterprises (London), Limited, 113-114, High Street, Shoreditch, engineers and merchants (representative, J. H. Vickers); Worthington-Simpson, Limited, Lowfield Works, Newark, general engineers, pumps, compressors, etc. (representative, W. S. Lawson).

As Members

Joseph H. Ainsbury, director, J. & H. Mellor, Limited, Oldham; R. J. Challen, deputy general manager, Iron & Steel Disposals, Limited, London; J. W. Cumberland, foundry manager, Newey Engineering Company, Limited, Nottingham; R. C. Cross, chief works metallurgist, P. R. Jackson (Salford), Limited; C. Daniel, foundry manager, Foster Bros. & Company, Preston; N. Gott, works manager and company director, Hargreaves & Gott, Limited, Rochdale; V. C. Hanson, director, Scottish Alloys, Limited, and Engineering Reconstruction, Limited, Hillington; A. Turner, assistant foundry superintendent, P. R. Jackson (Salford), Limited; G. E. Havelock, works manager, High Duty Alloys, Limited, Slough.

Transfers from Associate Member to Member

R. D. Cheyne, foundry consultant, Modern Foundry Planning Company, Manchester; H. Rice, general manager, J. Stubbs, Limited, Openshaw Works, Manchester; W. A. Turner, foundry consultant, W. A. Turner, Jeffrey & Company, Royston, Herts.

As Associate Members

L. H. Baxter, metallurgist, Ruston & Hornsby, Limited, Lincoln; F. E. Booth, foundry foreman, Harper, Phillips & Company, Grimsby; J. Buchanan, moulder, Comeleybank Foundry Company, Limited, Denny; A. Cameron, metallurgist, Clarke, Chapman & Company; A. E. Carter, foundry foreman, Newey Engineering, Nottingham; G. C. Coxon, patternshop foreman, Harper, Phillips & Company, Grimsby; G. P. Elson, B.Sc., metallurgist, T. Firth & J. Brown, Limited, Sheffield; R. F. Holland, technical adviser, Scammell Lorries, Limited, Watford; J. Jenkins, foreman patternmaker, Sir James Farmer Norton & Company, Limited, Manchester; W. Kennedy, foundry foreman, Clarke Chapman & Company, Limited, Gateshead; R. King, loose-pattern moulder, British Northrop Loom Company, Blackburn; K. S. Kwauk, mechanical engineer, Vickers-Armstrongs, Limited, Newcastle; A. P. Nayar, metallurgist and assistant foundry superintendent, Hindustan Foundry, Limited, Bombay; J. R. Pagan, patternshop and general foreman, Indian Iron & Steel Company, Limited, Kulti; E. L. Pipe, technical representative,, District Chemical Company, Limited, London; W. A. Poole, foundry foreman, W. L. Holland, Limited, Bolton; A. E. Read, representative, Eyre Smelting Company, Limited, London; P. D. Ridsdale, metallurgical chemist, Ridsdale & Company, Limited, Middlesbrough; F. Round, manager, Sun Pattern Service, Braintree; H. Simpson, moulder, Harding Casting Company, Liverpool; K. E. Smith, B.Sc.Tech., industrial chemist, R. & A. Main, Limited, London; William S. Stewart, foreman moulder, Clarke, Chapman & Company, Gateshead.

Transfer from Associate to Associate Member

C. Greenwood, charge-hand moulder, Sandholme Iron Company, Limited, Todmorden; A. R. Palmer, assistant metallurgist, Ransomes & Rapier, Limited, Ipswich.

(*Concluded on page* 473.)

Notes on the Practice at Argus Foundry*

Application of the Constant-charge System of Cupola Operation

By A. Jamieson

The system which will now be described is undoubtedly simple compared with one in which a large number of grades of iron are produced. In the manufacture of pressure-tight grey-iron castings experience has shown that reduction in phosphorus content, to about 0.15 per cent., produces greater freedom from porosity. Most of the Argus Foundry castings are subjected to hydraulic test, and since freedom from porosity is therefore essential, the phosphorus content is maintained below 0.2 per cent. throughout the entire range of castings produced. The fraction of the total output which is not subjected to hydraulic test is so small that it would be uneconomical to melt a higher-phosphorus iron for these castings.

Range of Castings Produced

The range in weight of the dressed castings is generally between 4 oz. and 15 cwt., and within such a range it is obvious that the carbon equivalent of the iron will require to vary if uniformity is to be maintained in light and heavy sections. To do this the total carbon is kept at approximately 3.3 per cent. and the silicon is varied to suit the casting section. Fig. 1 shows typical products of Argus Foundry, on the extreme right is shown a 10 in. by 24 in. pump body weighing 10½ cwts., in the centre is a 5 in. by 12 in. pump body weighing 2 cwts., while to the left is a 3½-in. piston valve chest weighing ¼ cwt. The small casting partly shown in the front, centre, is a 2-in. piston valve bell weighing 1 lb.

The foundry is engaged upon the production of marine auxiliaries and since these include large quantities of pumps, steam cylinders, and valve chests, a considerable number of castings have at least one surface which will be subjected to rubbing when in operation. In order to withstand this service condition, without producing difficulties during machining, it has been found desirable, when controlling the graphitising tendency of the iron, to aim at a combined carbon of between 0.6 and 0.8 per cent. The whole range of these castings can be produced within a silicon range of 1.2 to 2.0 per cent. and only in rare cases is it necessary to exceed this range.

These conditions, therefore, lend themselves to the use of a constant charge wherein the total carbon and phosphorus contents are kept at their respective quoted levels and the silicon content is varied to suit the type of casting being produced.

If, on any one day, the silicon content covers a range of, say, 1.2 to 1.8 per cent., the procedure is to make up the cupola charges so that the metal at the spout has the lowest silicon content required, and to make silicon additions in the ladle where necessary. A scheme, such as this, necessitates the use of a rapid method of judging the "hardness" of any ladle of metal and the control system in use will be described later.

In recent years the trend of work has been such as to require only a small quantity of the lower-silicon metal, and the practice has therefore been modified to include two types of charge: a cylinder

* An addendum to Mr. W. W. Braidwood's Paper "The Constant Charge System of Cupola Operation," given to various Branches of the Institute of British Foundrymen.

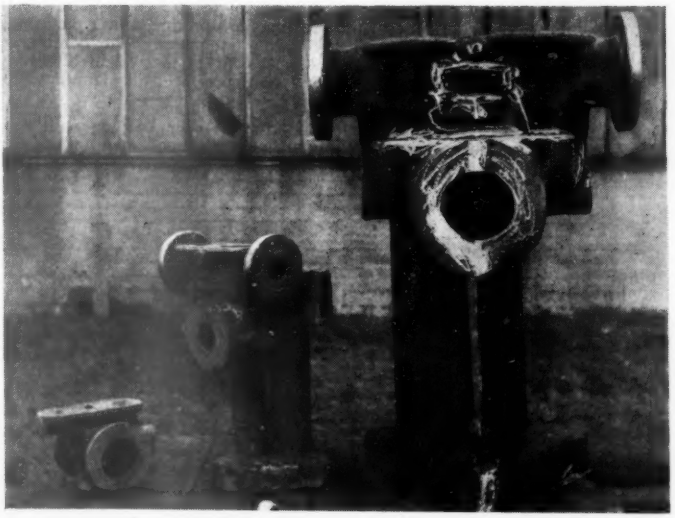


FIG. 1.—TYPICAL CASTINGS PRODUCED AT THE ARGUS FOUNDRY.

The Practice at Argus Foundry

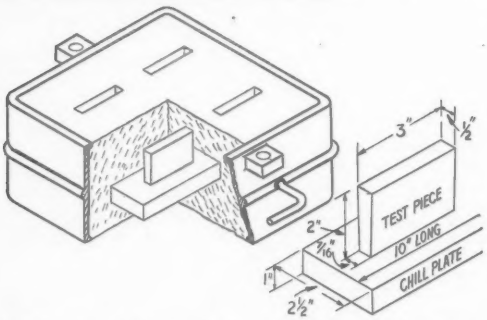


FIG. 2.—CHILL TEST-PIECE AND METHOD OF MOULDING.

iron at about 1.3 per cent. silicon and ordinary iron at about 1.7 per cent. silicon.

Metal Control

The cylinder iron is the first to be charged into the furnace and is followed, without any increase in the coke split, by the ordinary grade. Control tests are started with the first tap from the receiver and are continued at intervals throughout the entire period of melting. When this test indicates that the metal is too hard for the particular casting for which it is intended, additions of ferro-silicon are made at the spout. The test from the metal running into one ladle is generally used to estimate the quantity of ferro-silicon required for the following ladle. The time required to carry out the test is only one minute, however, and if a spout test be taken as soon as the receiver is tapped, extra additions can be made before the metal flow is stopped.

The grade of ferro-silicon used for spout additions contains approximately 47 per cent. silicon and when this is used at the rate of ¼ lb. per cwt. of metal, the silicon content is increased by approximately 0.1 per cent. A rapid estimation can therefore be made of the increase in silicon content, but for purposes of control the operator in charge of routine testing does not generally think in terms of silicon content, but rather in terms of the chill depth in the test specimen. It is the resultant effect of the various constituents in the iron which is of major importance, rather than the actual quantity of any one constituent. If conditions make necessary a total carbon of 3.5 per cent., the silicon will be low, but if the carbon drops to 3.2 per cent. the silicon content must be increased accordingly. The operator is therefore less concerned with what the silicon content ought to be than with what the specimen chill depth ought to be.

Test-piece Details

The test-piece used is wafer-shaped and the chill is induced on the bottom edge by means of a steel plate. These plates are embedded in green-sand moulds and two specimens are moulded on to each plate. Fig. 2 shows the arrangement. As soon as metal is poured into a specimen mould (this is horizontal and open) a sprig is inserted at one end in order to facilitate removal of the casting when the metal is solid. When it has solidified, and while it is still red-hot, the test-piece is removed and quenched in cold water. It is then broken and the chill depth is measured. Fig. 3 shows a specimen and typical fractures.

The shape and mass of the specimen are such that, within the range produced at Argus Foundry, an addition of 0.1 per cent. silicon at the spout will reduce the chill depth by approximately 0.1 in. Additions of ferro-silicon are therefore made on the basis that ¼ lb. ferro-silicon per cwt. of metal will reduce the chill by 0.1 in. A cylinder iron should give a chill depth of 0.35 to 0.5 in. and an ordinary iron should give a chill depth of 0.1 to 0.2 in. An intermediate grade is often required and this is obtained either by using the change-over metal between the two main grades, or by making ferro-silicon additions to the cylinder iron.

Nickel and nickel-chromium cast irons are produced as required by appropriate additions of nickel and ferro-chromium. The nickel cast irons are produced by adding 2 per cent. nickel to the low-silicon iron. From time to time castings are produced in 2 per cent. nickel, 0.3 per cent. chromium metal. The combined addition represents 2.5 per cent. of the weight of metal treated, yet no difficulty is experienced in manufacture.

Make-up of Charges

The make-up of the charges is in keeping with the policy already explained. The management preferred

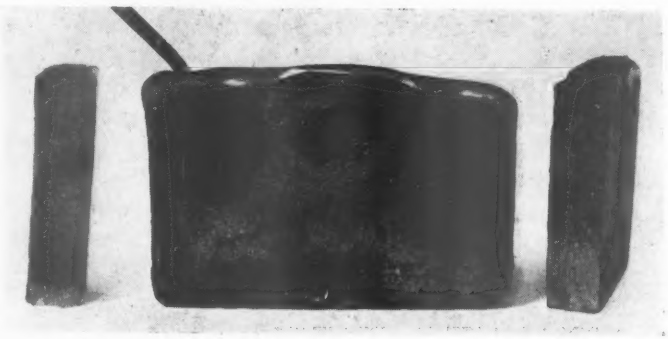


FIG. 3.—TEST-PIECE AS CAST, AND TYPICAL FRACTURES.

to use one type of low-phosphorus pig as the main constituent in both charges; especially a particular brand of pig which came close to the final requirements. Over a long run this was possible but unfortunately the iron can no longer be obtained, as the furnace from which it was produced has not been blown since last winter and the foundry is therefore now compelled to use whatever low-phosphorus pig-iron be available. The above-mentioned pig had the following percentage composition: T.C, 3.1 to 3.3; Si, 1.6 to 2.0; Mn, 0.8 to 1.0; S, under 0.05; and P, 0.17 to 0.23. Refined iron and steel scrap are used in order to keep down the total carbon in the cylinder iron, and in the ordinary-iron charge a little high silicon pig is used to soften, or steel scrap is used to harden, whichever be necessary.

No bought-in scrap is used and the internal scrap generally amounts to about a third of the charge. Hematite pig is used in both charges as a safeguard against any slight increase in the phosphorus content. Fifteen-cwt. charges are used and a typical example is as follows:—

	Cylinder iron.	Ordinary iron.
Hematite	2 cwt.	2 cwt.
Low phosphorus pig	5 „	8 „
Iron scrap..	5 „	5 „
Refined iron	3 „	—
High-silicon pig	—	80 lb.

Although ladle inoculation forms part of the system of control, it is not used with the intention of deriving benefit from any increase in strength. The majority of the castings are required to meet B.S. Specification 321, Grade A, which calls for 11 tons per sq. in. on a 1.2-in. dia. bar, while some are required to meet Grade C which calls for only 9 tons per sq. in. on the same size of bar. The ordinary iron averages 12 tons per sq. in. and the cylinder iron 14 tons per sq. in., so the specifications are met quite comfortably.

The Author's thanks are due to the directors of Argus Foundry for permission to give this Paper and to various members of the staff of Argus Foundry and the laboratory, G. & J. Weir, Limited, for help with the illustrations.

Publication Received

Skilled Hands. Published by the National Institute for the Blind, 224, Great Portland Street, London, W.1.

In a 34-page well-illustrated booklet, many examples are given of the useful jobs that can be done in industry by blind persons. The pamphlet is addressed to executives with the object that they may be induced to examine their own manufacturing set-up and to see if they could, with mutual benefit, employ blind people. The reviewer adds his reinforcement to the appeal and suggests that, as a beginning, they might write for a copy of this publication to the National Institute.

Cold-cathode Lamps in a Foundry

A lighting scheme using Osram cold-cathode fluorescent lamps is being installed in one of the foundries at C. A. Parsons' heavy engineering works, Newcastle-upon-Tyne. One of the factors which influenced the decision to use these lamps was the necessity for an installation which would require as little maintenance as possible in view of the fact that the mounting height is 40 ft. The Osram "daylight" lamps have a life of over 10,000 hrs. and thus replacements will not be required for a number of years.

The auxiliary gear is contained in the units, each of which comprises three lamps fitted in an enamelled reflector with a consumption of 250 watts per unit. The average intensity at floor level throughout the life of the lamps will be 12 to 15 lumens per sq. ft. A view of the installation is shown in Fig. 1.

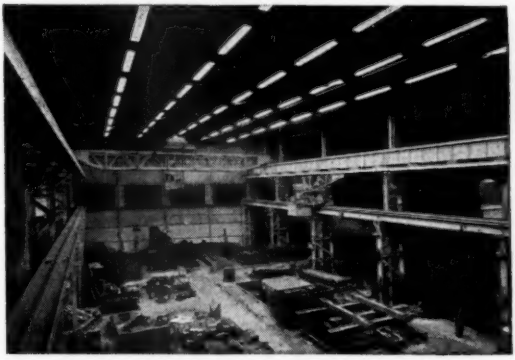


FIG. 1.—COLD-CATHODE FLUORESCENT LAMPS INSTALLED AT C. A. PARSONS & COMPANY, LIMITED.

In addition to the lamps, the G.E.C. supplied all fittings and auxiliary gear, and the scheme was designed by the Company's illuminating engineering department in conjunction with C. A. Parsons & Company, Limited. The G.E.C. is also undertaking a similar scheme for two assembly bays, which, together with the foundry, will bring the total number of units used to approximately 500.

Institute Elects New Members

(*Concluded from page* 470.)

As Associate over 21

D. W. Taylor, foundry student, Fraser & Chalmers, Limited, Erith.

As Associates under 21

F. G. Horton, assistant metallurgist, John Harper, Limited, Willenhall; W. A. Phillipson, apprentice patternmaker, Consett Iron Company, Limited; J. Urwin, metallurgical laboratory assistant, Pyrotenax, Limited, South Shields; L. C. Witchell, apprentice patternmaker, Bristol Foundry Company.

Company News

(Figures for previous year in brackets.)

Vosper—Dividend of 10% (same).

Heatrae—Dividend of 12½% (same).

A.C.E. Machinery—Dividend of 15% (same).

Simms Motor Units—Dividend of 5% (10%).

Robey & Company—Dividend of 10% (same).

W. J. Harris & Company—Dividend of 5% (nil).

Jury Holloware (Stevens)—Dividend of 10% (same).

Broken Hill South—Interim dividend of 30% (15%).

North Broken Hill—Interim dividend of 50% (30%).

Peter Brotherhood—Interim dividend of 8% (same).

Brooks & Doxey (Holdings)—Dividend of 20% (nil).

British Automatic Company—Dividend of 6% (same).

Joshua Bigwood & Son—Interim dividend of 5% (same).

Herbert Morris—Interim dividend of 5%, tax free (same).

Frederick Braby & Company—Interim dividend of 2½% (same).

National Electric Construction Company—Dividend of 10% (same).

British Vacuum Cleaner & Engineering Company—Dividend of 20% (same).

Babcock & Wilcox—Final dividend of 7% and bonus of 3%, making 15% (same).

Richard Johnson & Nephew—Final dividend of 10% (11½%), making 15% (same).

Mellor, Bromley & Company—Final dividend of 36½% (5%), making 54% (10%).

Sturtevant Engineering Company—Final dividend of 11%, making 16½%, tax free (same).

Rawlplug Company—Final dividend of 35% (30% and bonus of 5%), making 45% (same).

Bairds & Scottish Steel—Interim dividend of 10% to be regarded as a final payment (same).

W. T. Henley's Telegraph Works Company—Final dividend of 10% and bonus of 5%, making 20% (same).

Morris Motors—Final dividend of 14½%, tax free (12% and bonus of 2½%, tax free), making 24½%, tax free (same).

Lancashire Steel Corporation—Dividend at the rate of 8% per annum (same rate for 14 months) on the "A" and "B" ordinary shares.

British Lead Mills—Net profit for the year ended October 31, £27,944; final dividend of 20%, making 32½%; general reserve, £5,000; deferred repairs, £1,000; forward, £13,694.

British Rollmakers' Corporation—Net income for 1947, £35,850 (£68,260); to general reserve, nil (£40,000); preference dividends, £7,764 (£2,264); ordinary dividend of 15% per annum (same); forward, £25,956 (same).

Edwin Showell & Sons—Net profit for the year ended June 30, 1947, after taxation, etc., £11,336; dividend of 10% and bonus of 10%; general reserve, £2,000; staff pension fund, £8,000; forward, £2,326 (£3,546).

William Dixon—Net profit for the year ended February 28, £46,291, plus £40,000 transferred from suspense for taxation (£46,147 after tax); final dividend of 7½%, making 10% (same); forward, £84,367 (£42,405).

William Denny & Bros.—Trading profit for 1947, after income tax and profits tax, £90,315 (£106,992); interest, dividends, etc., £18,222 (£19,645); to depreciation, £33,499 (£29,883); general reserve, £35,000 (£40,000); dividend of 10% (same); forward, £38,848 (£38,810).

Aveling-Barford—Net profit for the 18 months ended September 27, 1947, after depreciation, etc., £111,866 (£23,583 for 12 months); to preference dividend, £11,281 (£5,122); final ordinary dividend of 10%, less tax (5%, tax free), making 19%, including 5%, tax free (10%, tax free); general reserve, £25,000 (nil); forward, £70,284 (£42,324).

Sanderson Bros. & Newbould—Trading profit for 1947, after providing for profits tax, £76,203 (£43,345); rents and interest, £1,121 (£696); to debenture interest, £3,876 (£3,889); directors' fees, £1,400 (same); depreciation, £9,604 (£7,779); reserve for income tax, £22,000 (£11,880); net profit, £40,444 (£21,093); final dividend of 5% on larger capital, making 10% (same); forward, £82,447 (£52,769).

Coltness Iron Company—Trading profit for 1947, £69,000; estimated interim income under Coal Nationalisation Act, £60,290; investment income, £22,957; dividends from subsidiaries, £149,117, making £302,264 (£372,025); to Imperial taxation, £38,500 (nil); redemption and depreciation, £8,000 (same); directors' fees, £4,000 (same); net profit, £251,764 (£360,025); dividend of 21¼% (same); forward, £603,030 (£504,985).

Laurence Scott & Electromotors—Net profit for 1947, £162,690 (£90,654); preference redemption, £6,600 (same); net dividends on preferences, £10,029 (£4,640); dividend of 12½% on "A" and "B" ordinary shares, £27,568 (same); to income tax 1948-49, £82,000 (£42,000); pensions, £5,000 (same); deferred annuity, £2,500 (same); capital redemption, £15,400 (same); general reserve, £10,000 (nil); forward, £8,588 (£4,996).

Breedon & Cloud Hill Lime Works—Interest received for the year to January 31, £251; trading profit, £71,119 (£55,494, including interest £331, plus E.P.T. refund, £13,232); to taxation, £32,520 (£37,715); directors' remuneration, £1,100 (same); net profit, £37,499 (£29,911); dividend of 35% (same); reserve for future taxation, £6,000 (nil); reserve against investments, £3,500 (nil); general reserve, £5,000 (same); forward, £10,624 (£10,484).

Sangamo Weston—Trading profit for 1947, £197,179 (£105,444); other income, £1,815 (£2,080); to depreciation, £17,967 (£19,332); reconstruction, etc., £1,227 (£1,258); A.R.P., nil (£229); written off patents, £526 (£688); directors' fees, £1,200 (£1,400); audit, £550 (£473); interest, £196 (£195); tax, £99,665 (£36,948); loss on realisation of investment, £1,408 (nil); net profit, £76,255 (£47,001); dividend of 17½% (same); forward, £235,840 (£174,744).

Watford Electric & Manufacturing Company—Trading profit, less expenses, depreciation, etc., £31,781 (£24,429); interest and fees, £68 (£81); previous tax provision not now required, £3,256 (nil); previous provision for contracts not now required, £2,638 (nil); to directors' fees, £600 (£400); taxation, £18,684 (£9,384); building reserve, £2,000 (£1,000); special depreciation, £600 (nil); dividend of 15% (same); forward, £49,623 (£40,694).

B. Finch & Company—Trading profit for 1947, after working expenses and depreciation, £99,488 (£96,466); to directors' remuneration, £11,412 (£9,841); bank interest, £5,522 (£2,728); mortgage interest, £281 (£283); pensions, £1,836 (£1,405); net profit, £80,437 (£82,209); to tax, £40,728 (£47,543); final dividend of 24%, making 30% (same); written off goodwill, £10,000 (£5,000); to reserve, £8,500 (£10,000); directors' additional remuneration, £1,000 (same); forward, £16,642 (£10,983).

James H. Lamont & Company—Trading profit for 1947, £93,044 (£69,730); other income, £2,517 (£2,070); to administration, etc., £37,847 (£30,711); depreciation, £6,182 (£5,200); net profit, £51,532 (£35,889); to staff bonuses, £575 (same); directors' fees, £900 (same); tax, £32,769 (£16,858); written off goodwill, patents and trade mark, £3,475 (£3,232); general reserve, £3,000 (same); benevolent, £200 (same); final dividend of 20%, making 25% (same); participating dividend on preference shares of 2% (same); forward, £2.079 (£2,356).

Victaulic Company—Manufacturing and trading profit for 1947, £44,804 (£42,389); E.P.T. recoverable, nil (£6,900); interest, £1,760 (£482); to directors' fees, £875 (same); other remuneration to directors, £2,915 (£2,951); staff fund, £412 (£531); depreciation, £4,068 (£3,193); profits tax, £7,100 (nil); income tax, £11,000 (£20,079); net profit, £20,194 (£22,142); to obsolescence, £10,000 (same last year general reserve); final ordinary dividend of 3%, making 6%, less tax (same), and bonus of 15%, tax free (same); forward, £10,034 (£11,278).

Superheater Company—Trading profit for 1947, after all expenses, including tax and depreciation, £186,752 (£144,315); excess tax provision released, £9,000 (nil); dividend from subsidiary, £3,570 (£3,060); interest, £2,119 (£3,149); surplus on realisation of investments, £971 (£3,031); to preference redemption, £6,347 (£6,044); preference dividend reserve, £4,178 (£70); tax reserve, £100,000 (£68,000); general reserve, £45,000 (£20,000); pension reserve, £2,500 (same); development reserve, nil (£7,000); preference dividend, £8,059 (£8,226); ordinary dividend of 45% (42½% and cash distribution of 2%, tax free); forward, £32,383 (£28,540).

Dr. Van der Bijl's Report Not to be Published

Decision Criticised in the Lords

The Government will not publish the report made by Dr. H. J. Van der Bijl, who visited this country two years ago, at the request of the Government, with the object of investigating the iron and steel industry here. Dr. Van der Bijl was alleged to have advised the Government against the nationalisation of the iron and steel industry and to have given his reason for that advice.

Replying to Viscount Elibank, in the House of Lords on May 4, Lord Henderson said Dr. Van der Bijl visited the United Kingdom in the summer of 1946 in connection with the invitation of the United Kingdom Government to become the first chairman of the Iron and Steel Board. While he was unable, owing to his interests in South Africa, to accept the invitation, H.M. Government had the benefit of consultations with him on the arrangements for the appointment of the Board and various general questions affecting the future operation of the iron and steel industry.

The conversations were not undertaken with a view to publication of the report, and he regretted the Government did not see its way to comply with the request of Viscount Elibank.

Viscount Elibank expressed disappointment with the reply and said it appeared the Government had so little faith in its own policy that, while it called to its aid the advice of an expert on this subject, it was not prepared to disclose the terms for fear of the result in the mind of the public.

"There is no justification for that," Lord Henderson replied.

Director of Defence Research

Dr. F. J. Wilkins has been appointed Principal Director of Scientific Research (Defence) in succession to Dr. E. T. Paris. Under the Controller of Supplies (Munitions) and the Chief Scientist he will be responsible for research on munitions and allied equipment. In 1941 Dr. Wilkins joined the Ministry of Supply from Imperial Chemical Industries, Limited, and was appointed Regional Development Officer (Western Region) for the Royal Ordnance filling factories. In 1944 he was appointed Assistant Director of Filling Factories and in 1945 became Deputy Chief Superintendent of Armament Research at the Ministry. Since April, 1946, he has been Director of Chemical Research and Development.

THE MINISTER OF SUPPLY, Mr. G. R. Strauss, visited a number of works in Lancashire recently, including the English Electric Company, Limited, Preston, Renold & Coventry Chain Company, Limited, Didsbury, Hick, Hargreaves & Company, Limited, Bolton, and James Stott & Company (Engineers), Limited, Oldham. He met representatives of both sides of industry.

Personal

MR. G. W. BARNES has resigned from the board of the Premier Metal Company of South Africa, Limited.

VISCOUNT EDNAM has been appointed a director of Round Oak Steel Works, Limited, Brierley Hill, Staffs.

MR. H. R. CLEMENT and MR. WILLIAM PARRY have been elected directors of Associated Clay Industries, Limited.

MR. H. F. G. LANGLEY and MR. JOHN TAYLOR have been elected directors of the Expanded Metal Company, Limited, London, S.W.1.

MR. M. F. ANDERSON has been appointed a director of the Steel Corporation of Bengal, Limited, in place of MR. B. F. PETRE, who has resigned.

MR. M. M. REID has been elected a director of Linotype & Machinery, Limited, London, W.C.1, in place of MR. F. T. MACKEY, who has resigned.

MR. T. H. MARTIN-HARVEY has been elected a director of the Telegraph Condenser Company, Limited, in place of MR. D. W. ALDRIDGE, who has resigned.

MR. R. C. PILSBURY has been appointed managing director of the General Cable Manufacturing Company, Limited, in place of MR. R. WOODS, who has resigned.

MR. GEORGE MORRISON, general manager, has been appointed managing director of the Greenock Dockyard Company, Limited, in succession to the late Mr. S. M. Turnbull.

MR. I. M. STEWART, managing director of Thermotank, Limited, and of the Thermotank Engineering Company, Limited, Glasgow, has been appointed to the board of the National Bank of Scotland, Limited.

MR. C. E. BEYNON, head of the chemistry and metallurgical department of Wolverhampton and Staffordshire Technical College, has been appointed Principal of Darlington Technical College in succession to MR. J. A. ANGLES, who retires in September.

MR. HORACE W. CLARKE, president of the British Non-ferrous Metals Federation, is to receive the honorary degree of Doctor of Science of Birmingham University in July. Mr. Clarke is managing director of James Booth & Company, Limited, Birmingham.

MR. J. A. SKERRY, outside manager of Richardsons Westgarth & Company, Limited, Hartlepool, has received a presentation to mark the occasion of his retirement at the age of 71. He has been with the company for 55 years and during that time has been responsible for the fitting out of 125 ships.

MR. D. RHODES, who has been secretary for over 30 years of the Renold & Coventry Chain Company, Limited, Manchester, has retired. MR. W. S. C. TULLEY, a director and general administration manager of the company, succeeds him as secretary, and MR. F. T. ROBERTSON has been appointed assistant secretary.

MR. E. H. ARMITAGE has resigned from his position as chairman of Brown Bayley's Steel Works, Limited, Sheffield. MR. J. W. GARTON has been appointed chairman, MR. S. G. NEWTON and MR. H. BULL joint managing directors, and MR. J. S. RIDGES commercial director, while MR. J. H. MERRY has been appointed secretary of the company.

MR. W. H. SMITH, deputy managing director of Allied Ironfounders, Limited, MR. W. H. MARR, president of Glasgow Chamber of Commerce, MR. JOHN T. M'INTOSH, managing director of Hurst, Nelson & Company, Limited, and DR. J. W. M'DAVID, chairman, Explosives Division, Imperial Chemical Industries, Limited, are among those who have accepted invitations to serve on the district advisory committees of the Scottish Board for Industry.

LT.-COL. H. H. JOHNSON has retired at his own request after 22 years' service in the Regular Army in order to take up an active directorship in Wm. Johnson & Sons (Leeds), Limited, engineers. He was commissioned in the Royal Artillery from the Royal Military Academy, Woolwich, in 1925, and prior to 1939 served at home and in Ceylon, Hong Kong, Shanghai, and Malta. From 1943 to 1945 he was Lieut.-Colonel commanding 2nd India Heavy A.A. Regiment Royal Artillery on the Burma-Assam Front and was mentioned in General Slim's 14th Army despatches. In 1945, he was appointed G.S.O.I., R.A., G.H.Q., India Command, and later went to Egypt in 1946 as A.A.G., H.Q., Middle East Forces.

Wills

MALEY, F. H., of Oldham, ironfounder £6,272

ISSOTT, CHARLES, of Hitchin, Herts, retired engineer £14,722

WILD, JOHN, director of Condor Ironworks, Limited, Oldham £9,344

CLAYSON, E. W., of Northampton, iron and steel merchant £838

BURY, PETER, formerly works manager of Stewarts and Lloyds, Limited £3,633

BRAZIL, J. P., of Bristol, a director of the Ashton Vale Iron Company, Limited £2,602

HELLIWELL, W. H., for over 40 years manager of the Calder Valley Engineering Company £3,144

ELLISS, W. E., managing director of William Elliss & Sons, Limited, ironfounders, of Sheffield ... £16,792

THOMAS, D. H., of Gayton, Northants, proprietor of the Midland Piston Ring & Motor Company ... £7,949

COLTMAN, JOHN, managing director of John Coltman & Company, Limited, structural engineers, of Leicester £24,334

GRANT, GREGOR, formerly a director of P. & W. Maclellan, Limited, engineers and wagon builders, etc., of Glasgow £5,585

BAKER, HARRY, of Birmingham, secretary of the Midland area of the National Union of Manufacturers since 1919 ... ... £3,628

MCINNES, LATIMER, of Campbeltown, formerly secretary and a director of the Campbeltown Shipbuilding Company (now dissolved) £19,993

MITCHELL, F. L., managing director of H. Mitchell & Son, Limited, general construction engineers and welders, of Doncaster £7,811

CORTON, WALTER, for many years West of England technical representative of Gent & Company, Limited, manufacturing electrical engineers, of Leicester £2,063

PATE, JOHN, chairman and managing director of the Anderson-Grice Company, Limited, crane manufacturers, etc., of Carnoustie, and president of George Anderson & Company of Canada, Limited £33,865

MITCHELL, SIR GEORGE A., late chairman of the Lochgelly Iron & Coal Company, Limited, and the Flemington Coal Company, Limited, Glasgow, and a director of Stewarts and Lloyds, Limited, and other companies £341,368

THE MODERN PIG

IF YOU WANT...
clean iron, free from sand, free from sows ...uniform analysis... convenient size...easy handling... specify STANTON MACHINE CAST PIG IRON

SPECIFICATION

WEIGHT	80-90 lbs.
Length	22 inches
Width	8½ inches
Thickness	3¾ inches

(at notch 2½ inches).

Made in our well-known

STANTON, HOLWELL & RIXONS BRANDS

THE STANTON IRONWORKS COMPANY LIMITED NEAR NOTTINGHAM

News in Brief

CHROME SERVICE, LIMITED, South Shields, is to open a factory at Blyth, Northumberland.

STEWARTS AND LLOYDS, LIMITED, announces a special discount to home trade customers of 2½ per cent. off the prices of about 90 per cent. of its steel tubes.

SPECIALLOID, LIMITED, has appointed Mr. Ernst. Goldschmidt, P.O. Box 274, Mogadishu, Somalia, as its sole main distributor in the territory of Somalia.

WELLINGTON TUBE WORKS, LIMITED, Tipton, Staffs, has announced a price reduction of 2½ per cent. net on all tubes and fittings for the home trade as from May 1.

APRIL WAS AN all-time record month in vehicle and tractor production at the Dagenham works of the Ford Motor Company, Limited, a total of 12,930 vehicles being produced.

THE ARGENTINE NATIONAL ECONOMIC COUNCIL has decided to place an order with Cammell Laird & Company, Limited, Birkenhead, for the construction of four tankers for delivery in 1951.

THE BRITISH OXYGEN COMPANY, LIMITED, proposes to increase its capital from £6,000,000 to £10,000,000 by the creation of 4,000,000 £1 shares. No immediate issue of shares is contemplated.

AN EXTRA-ORDINARY general meeting of the E.N.V. Engineering Company, Limited, has been called for May 18 to consider a resolution for splitting the £1 ordinary shares into 5s. denomination.

A REPORT issued by the Steel Company of Wales, Limited, reveals that the early promise of good progress on work in connection with the company's reconstruction scheme has been maintained.

DIRECTORS AND MANAGERS of Edgar Allen & Company, Limited, steelmakers, etc., of Sheffield, were the guests of the firm's foremen's association at a recent dinner—the first to be held since the war.

JOHN READHEAD & SONS, LIMITED, shipbuilders, of South Shields, has decided not to proceed, for the time being, with the erection of a new patternshop for which plans were approved some time ago.

THE GLENBOIG UNION FIRECLAY COMPANY, LIMITED, Glenboig, Lanarkshire, is reported to have increased production by 38 per cent. in the first three months of this year compared with the same period in 1947.

THE COTTAGE AT Wylam-on-Tyne (Northumberland) in which George Stephenson was born in 1781 is to be bought for the National Trust for £1,200 by the North East Coast Institution of Engineers and Shipbuilders.

A SPECIAL COMMITTEE for the exploitation of the former British-owned Argentine railways has placed an order in the United Kingdom for the supply of 35 freight locomotives for the Central Argentine Railway.

IN FACE OF keen competition from the United States, an order of the value of £75,000 has been secured by Howell & Company, Limited, Wincobank, near Sheffield, for 62,000 steel boiler tubes for an Argentine railway company.

GRANTHAM BOILER & CRANK COMPANY, LIMITED, which recently secured an order for apparatus required in connection with plant for atomic research, has now obtained a further contract. The original order is expected to be completed about the end of this month.

NEWCASTLE-UPON-TYNE EDUCATION COMMITTEE is to spend £50,000 on the erection of a workshop block as a first instalment of a plan for a new College of Technology. The workshop will include a heat engines laboratory and a hydraulics laboratory.

A NEW ERECTING SHOP costing £30,000, which will be used for assembling railway switches and crossings, has been completed by the Darlington Railway Plant & Foundry Company, Limited. The extension is expected to increase the works capacity by about 25 per cent.

STEEL & COMPANY, LIMITED, Sunderland, expect substantial orders from Canada next month for mobile cranes. The first of three 6-ton mobile cranes ordered from Toronto was loaded in the Tyne last week. Mr. Eric Steel, managing director of the company, is going to Canada in June to discuss further orders.

EXHIBITIONS TO commemorate the George Stephenson centenary celebration in Newcastle-upon-Tyne will be held at a local art gallery and science museum. An exhibition of modern rolling stock will also be held at Manors Station, Newcastle, on August 15, when modern locomotives, kitchen cars and breakdown cranes will be on show.

A CAPITAL INCREASE of £2,875,000 in British Titan Products, Limited, above the registered capital of £1,125,000 has been filed. The company, with works at Billingham, Co. Durham, manufactures titanium pigment. The £2,875,000 increase is in 1,000,000 4½ per cent. cumulative preference, 1,000,000 ordinary and 875,000 unclassified shares, all of £1 each.

FURTHER IMPROVEMENTS are to be carried out to Blyth shipyard by the Blyth Dry Docks & Shipbuilding Company, Limited. Extensions in hand include the building of a new erection shop, further facilities for the installation of machinery, and a new coppersmiths' shops. Plans are being considered for the provision of a bay for electric welding.

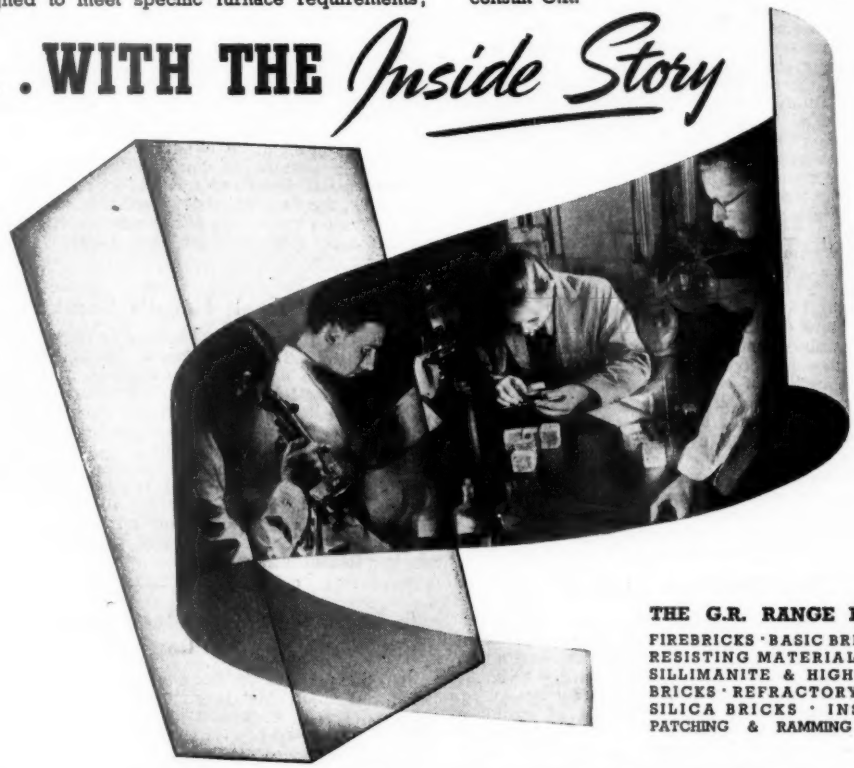
DR. W. N. THOMAS, professor of engineering, University College of South Wales and Monmouthshire, Cardiff, who was head of the R.E. 2/4 Division of the Research and Experiments Department of the Ministry of Home Security during the war, was recently presented with the United States Medal of Freedom by the United States Military Attaché, Major-General Clayton L. Bissell.

ASSOCIATED BRITISH OIL ENGINES, LIMITED, has received orders for 26 sets of Diesel-electric auxiliaries driven by engines built by Mirrlees, Bickerton & Day, Limited, Stockport, for installation in ships which the company is building for the British Tanker Company, Limited. The company has also received from the Intercontinental Engineering Company, of Brussels, an order for six Mirrlees "TLRA6" 6-cylinder marine Diesel engines for installation as propulsion units in existing Rhine barges.

FURNACE LINING ECONOMY BEGINS

That G.R. products are widely used because they can be depended upon to provide strong, stable and lasting furnace structures and linings, is due to the foresight and the exceptional care taken in manufacture, development and research. Whether Basic, Silica, Fireclay or any other type of refractory material, the G.R. range is so wide that the correct choice is always possible. Each type is designed to meet specific furnace requirements; manufacturing processes employing the latest in plant and equipment are developed to maintain uniform quality at standards which G.R. research maintains at the highest level of efficiency. These activities are all directed by a comprehensive practical knowledge of furnace conditions. That is why for the finest refractories and sound technical assistance it always pays to consult G.R.

. . . WITH THE *Inside Story*



THE G.R. RANGE INCLUDES

FIREBRICKS · BASIC BRICKS · ACID RESISTING MATERIALS · SANDS SILLIMANITE & HIGH ALUMINA BRICKS · REFRACTORY CEMENTS SILICA BRICKS · INSULATION PATCHING & RAMMING MATERIALS

GENERAL REFRACTORIES

LIMITED

GENEFAX HOUSE, SHEFFIELD, 10. TELEPHONE · SHEFFIELD 31113

184

Raw Material Markets

Iron and Steel

Consumption of basic pig-iron is on an exceptionally heavy scale and, as the supply of scrap is still deficient, there is no immediate likelihood of any blast furnaces being diverted to the production of foundry iron. Foundry allocations are disappointing and stocks of both pig-iron and scrap are at such a low level that the makers of light and heavy iron castings are operating on a hand-to-mouth basis. They have an abundance of work in hand, but there is no prospect of increasing production until raw materials are freely available. Fortunately, the coke situation is more favourable and there has been some acceleration in the deliveries of scrap, which promises to continue.

Activity in the re-rolling industry is well maintained, though still more generous supplies of semi-finished steel are needed to keep the mills in full production. Substantial tonnages of blooms, slabs and the larger sizes of billets are being provided by British producers, but the scarcity of small billets adversely affects the output of light sections and narrow strip. Home demand for sheets and all classes of re-rolled material is exceptionally brisk and re-rollers are also engaged on an increased volume of export orders.

In the first quarter of the current year, exports of finished steel fell short of the figures for the corresponding period of 1947. But export bookings for the current period are on a heavier scale and shipments will almost certainly be increased. Nevertheless, under the new authorisation procedure, very heavy tonnages of plates, sections, joists, and rails are retained for essential home industries. Shipbuilders, railways, and collieries have been allotted big supplies and considerable tonnages are also required for the execution of substantial overseas engineering contracts. A big proportion of the output of the tubeworks is earmarked for export, and the overseas demand for black and galvanised sheets is overwhelming. Special steels are also in brisk demand both for home and export.

Non-ferrous Metals

Once again hopes of seeing the London Metal Exchange reopened have been dashed. The Minister of Supply has said that no decision has been reached, and it appears that the main trouble is still felt to be the scarcity of the metals in which dealing takes place. This time there had been a good deal of optimism that something would be done, for the Committee of the Exchange had submitted a plan deemed to be workable, and it had been known for some time past that the Government has no objection in principle to a reopening, provided that suitable safeguards were introduced to prevent undesirable speculation.

The trade is becoming increasingly aware of a change in the situation which is affecting demand for the products of the mills and foundries. This altered outlook seems to be due to caution on the part of the consumers, who are endeavouring to cut down their commitments and reduce stocks. That reserves in the hands of manufacturers and wholesalers have been onerous for some time past can hardly be doubted and, now that the general public is drawing its purse strings tighter, confidence is being sapped. The whole trouble is, of course, that prices are dangerously high, much too high to inspire confidence in the circumstances in which Britain finds herself to-day. These might be called luxury levels and, as a basis for reconstruction, are well beyond the reach of a Europe impoverished by war. In the United States, no doubt, lead at 17½ cents per lb. does not matter too much, although it is reported that consumption is beginning to suffer. But as an importing country which does not produce these metals from indigenous ores, Britain is vitally interested in seeing quotations lower.

The scrap market is beginning to register in unmistakable fashion the fears that now beset the industry and, although no alteration has been made in virgin metal quotations, secondary brass and copper have lost ground to a marked extent and the end of the decline is not yet in sight. It is believed that the Ministry of Supply is anxious to liquidate its holding of non-ferrous metal semis and scrap as soon as possible and, possibly, the fear of what effect this selling pressure will have on the values of secondary metals is responsible for the downward tendency that is now developing.

Cammell Laird's Capital

Presiding at the annual meeting of Cammell Laird & Company, Limited, on May 4, Sir Robert S. Johnson, chairman and managing director, said that if the company could get rid of the controls and restrictions with which it had to contend and the irritating delays caused thereby, it would very soon get back to its pre-war speed of building ships.

He referred to the board's promise to write up the value of the company's stock units as soon as it was in a position to do so. Owing to the tax on transactions of this nature it would now cost a prohibitive amount and the board had felt impelled to leave the matter for the present.

No Decision Yet on Reopening of Metal Exchange

No decision has yet been taken about the reopening of the London Metal Exchange. The Minister of Supply (Mr. G. R. Strauss) told Sir John Mellor in the House of Commons last week that the reopening of the Exchange was being held up mainly by the acute shortage of the metals dealt with there. He was unable to say when he would be able to make any definite statement about it.

British Automatic Company—Profit for 1947, after tax and depreciation, £25,345 (£15,891); written off properties, £6,055 (£2,711); to revenue reserve, £5,292 (nil); dividend of 6% (same); forward, £11,752 (£10,954).